PROJECT MANAGEMENT PLAN
JOHN H. KERR
FEASIBILITY STUDY
UNDER SECTION 216 OF PUBLIC LAW 91-611, AS AMENDED

JOHN H. KERR DAM AND RESERVOIR
LOWER ROANOKE RIVER
VIRGINIA AND NORTH CAROLINA

US Army Corps
of Engineers
Wilmington District

JULY 2004

PROJECT MANAGEMENT PLAN
FOR
FEASIBILITY STUDY
UNDER SECTION 216 OF PUBLIC LAW 91-611, AS AMENDED

JOHN H. KERR DAM AND RESERVOIR
LOWER ROANOKE RIVER
VIRGINIA AND NORTH CAROLINA

Prepared by:

US Army Corps of Engineers
Wilmington District

The State of North Carolina

The Commonwealth of Virginia

US Army Corps of Engineers
Wilmington District

FEASIBILITY STUDY
UNDER SECTION 216 OF PUBLIC LAW 91-611, AS AMENDED
JOHN H. KERR DAM AND RESERVOIR
LOWER ROANOKE RIVER
VIRGINIA AND NORTH CAROLINA

TABLE OF CONTENTS

LIST OF ATTACHMENTS

FEASIBILITY STUDY
UNDER SECTION 216 OF PUBLIC LAW 91-611, AS AMENDED
JOHN H. KERR DAM AND RESERVOIR
LOWER ROANOKE RIVER
VIRGINIA AND NORTH CAROLINA

Introduction

The Feasibility Study, authorized under Section 216 of Public Law 91-611, the River and Harbor and Flood Control Act of 1970, as amended, will review the operation of the John H. Kerr Dam and Reservoir and report recommendations to Congress on the advisability of modifying the structures or the structure's operation and for improving the quality of the environment in the overall public interest. Information developed during the Feasibility Study may become the basis for actions specifically authorized by Congress or by the legislatures of the Sponsors, the State of North Carolina, and the Commonwealth of Virginia, for actions under the continuing authorities of the US Army Corps of Engineers, and for actions by non-government organizations. The Study provides interested parties an opportunity to integrate multiple perspectives and assets to achieve the common goal. The parties commit to effective and efficient management of their responsibilities for the Study, and to the sharing of information about the Study.

Approval of participation in this Feasibility Study by the US Army Corps of Engineers, Wilmington District, was based on the Reconnaissance Phase Section 905(b) Analysis for John H. Kerr Dam and Reservoir, Virginia and North Carolina 216 and a Supplemental Sheet prepared in response to comments on the 905(b) from the U.S. Army Corps of Engineers South Atlantic Division. These documents indicate that the Feasibility Study will address subjects determined in the Initial Appraisal Report for the Study, and identified by citizens during hearings held in the Study area. More than 40 topics were identified and categorized into 11 Study Subjects. These tasks have been modified by combining the Downstream Aquatic Habitat task with the Diadromous Fish task to form the Diadromous Fish and Downstream Riverine Aquatic Resources Task. The Applicable Laws and Regulations Task has been deferred until later in the Study process. There are 9 remaining study subjects to be addressed. Task implementation has been developed to consider of each Study Subject. US Army Corps of Engineers Regulation 1105-2-100, Planning Guidance Notebook, provides full guidance regarding conduction of the study.

Study Area Description

The John H. Kerr Dam and Reservoir is located on the Roanoke River, about 178.7 river-miles above the mouth. It is in Mecklenburg County, Virginia, 20.3 miles downstream from Clarksville, Virginia, 18 miles upstream from the Virginia-North Carolina border, and 80 air-miles southwest of Richmond, Virginia. The area of inundation at the top of the gate elevation for the Reservoir extends upstream on the Roanoke River 56 miles and extends 34 miles on the Dan River. The project was completed in 1952.

John H. Kerr Reservoir is a significant regional resource. It provides quality natural resource-based recreation for area residents and a desirable outdoor experience for more than 2 million visitors a year. It provides municipal and industrial water supply, wastewater assimilation, and enhanced farming and forestry opportunities. The Roanoke River Basin below John H. Kerr Dam and Reservoir is one of the finest remaining river swamp forest ecosystems within the eastern United States. These bottomland hardwood forests, uplands, and streams provide a high quality habitat for fish, wildlife and waterfowl.

The study area includes the John H. Kerr Dam and Reservoir and the Roanoke River Basin beginning at the Dam and proceeding downstream to the Albemarle Sound. For this study, the area will be referred to as the Lower Roanoke River Basin. The Study Area is located in Charlotte, Halifax, Mecklenburg, and Brunswick Counties of Virginia, and in Granville, Vance, Warren, Halifax, Northampton, Bertie, Martin and Washington Counties of North Carolina. A Reconnaissance Phase Section 905(B) Analysis is currently underway for the Philpott Lake to determine if there is an interest in undertaking a Section 216 study for Philpott. If a 216 Study is undertaken at Philpott, the study teams will work closely together to assure that any changes are implements system wide. The Philpott Lake study area includes Patrick, Franklin, Henry, and Pittsylvania Counties in Virginia, and Rockingham and Caswell Counties in North Carolina. The study area is located in the following Virginia and North Carolina Congressional Districts, respectively, the 4th and 5th and the 1st and 3rd.

The Phases of the Study

This Project Management Plan (PMP) will be prepared in three phases. The first phase details the plan for the Feasibility Study to the first major decision point, the first In-Progress Review (IPR). In the first phase of the Study, existing data about the Study Subjects will be gathered, and recommendations for further study will be developed. As the Study progresses, the PMP will be modified to detail the plans for Phases 2 and 3. The Sponsors may request changes in the PMP, which will be changed by the USACE as plans for the Study change.

Upon completion of Tasks in Phase One, an IPR with more senior USACE representatives and resource agency representatives will be conducted. The IPR will be a Feasibility Scoping Meeting, as described in USACE Planning Guidance Notebook, Appendix G. The Feasibility Scoping Meeting will ensure that the Study is correctly focused and that the essential Study objectives are addressed.

In Phase Two of the Study, multiple technical studies addressing identified objectives, will be performed to develop specific, quantitative, and qualitative goals and to assess existing problems, needs, and opportunities. Addressing identified objectives in Phase Two via data collection, modeling, and analysis will set the stage for alternative development in Phase Three.

In Phase Three of the Study, alternatives will be developed and evaluated to meet the goals and objectives identified in Phase Two. Outputs and impacts of each alternative will be determined, trade-off analysis performed, and, if appropriate, actions selected for recommendation to Congress. A feasibility report and National Environmental Policy Act documentation will be prepared.

Within the first phase, the Project Management Plan requires the following tasks for each Study Subject.

- Gather and evaluate existing relevant data.
- Identify gaps in the existing relevant data.
- Develop recommendations to fill gaps in the existing relevant data.
- Identify and evaluate existing methods and tools for study of the subject.
- Develop a plan to keep models and data available to the public and in compatible formats.
- Develop an approach for combining individual models and investigations into an overall system evaluation.
- Develop a stepwise procedure to conceive and test alternatives to the existing condition.
- Complete a risk analysis evaluation associated with gaps in existing methods and tools necessary for study of the subject.
- Develop recommendations regarding further study of the subject.

The level of accuracy within the descriptions and the associated cost estimates depends upon the extent of uncertainties and the depth of investigations made in preparing them.

The detailed focus and scope of the entire Feasibility Study is incomplete. All investigations performed for the Study will, at a minimum, comply with legal obligations and administration policy and will not compromise professional standards. This will allow the all results of the Study, even parts not receiving detailed analysis, to be of use and value to the Sponsors and USACE. Requirements exceeding these minimum standards are presumed and will be negotiated by the Sponsors and the USACE, based on complexity, available resources, and associated risks.

For each Study Subject, adequate information will be developed in Phase One to produce a product allowing the Sponsors and USACE decision-makers to decide what additional investigation may be needed. Documentation and evaluation of existing data and study methods will be produced for use by the Sponsors and USACE regardless of whether it becomes incorporated as a Study Subject in the Feasibility Study. Initial goals of the IPR are to provide information for determining areas in need of further study and to provide information regarding authorized operation of John H. Kerr Dam and Reservoir for environmental restoration considerations and for the Sponsors in the performance of their authorized functions.

Communication and Decision-making Processes

The Project Delivery Team (referred to as the Study Management Team in the Feasibility Cost Sharing Agreement) is committing to the detailed Task Outline described below, to ensure full communication and for identifying and resolving any concerns, problems, or disagreements. Resolutions shall be reached through discussion among employees in the study management level in which the issue arises and will be resolved at the earliest possible stage.

Examples of matters that may be discussed in these processes include coordination of USACE's requests for funds with the funding cycles of the Sponsors, a Sponsor's potential need to suspend the Study due to lack of funding, and identification of work which the Sponsors may propose for negotiation as work in-kind.

USACE and the Sponsors commit to appointing individuals with equivalent authority to act for them, to ensure constant representation is available during established time periods for these processes. Communication may include telephone and electronic communications and face-to-face discussions, as needed to keep each other timely informed on all matters related to the Study.

As the Feasibility Cost Sharing Agreement states, the John H. Kerr 216 Executive Committee is tasked with ensuring consistent and effective communication. The following individuals are designated to serve on the Executive Committee: David Paylor, Virginia Deputy Secretary of Natural Resources; John Morris, Director, North Carolina Division of Water Resources; and the District Engineer of the Wilmington District Corps of Engineers. The Executive Committee will generally oversee the Study, consistent with this PMP, and will make recommendations deemed warranted to the District Engineer, including suggestions to avoid potential sources of dispute. The Executive Committee will meet at least quarterly until the end of the Study Period. Location and specific times will be determined during conduction of the study.

The Project Delivery Team will inform the Executive Committee of significant pending issues and actions and will prepare monthly written reports to the Executive Committee documenting the progress of the Study. Task expenditures will be documented in these monitoring reports to provide adequate time for full discussion of possible excess Study Costs before they are incurred.

To ensure timely completion of the John H. Kerr 216 Feasibility Study, any member of the Executive Committee, the Project Delivery Team, or subject matter specialist employed by USACE may request immediate discussion of any arising issues affecting the Study.

Upon the conclusion of Phase One, the PDT will prepare and present recommendations for Phase Two, to the Executive Committee. Recommendations from the PDT will include a proposed scope of work which will define tasks, costs, responsible parties, and cost sharing requirements. The Executive Committee will present the final recommendation to the USACE, Wilmington District Commander. Each phase of the Study will undergo this uniform approach for development and presentation.

Prior to issuance of any order under the Study contract, the party issuing the order shall allow other involved parties a minimum of ten working days to review the order. Proposals for contract award will be available for evaluation by interested and involved parties to the required extent as defined by all applicable laws and regulations.

Public Involvement, Collaboration, and Coordination with Other Agencies

As established by USACE Regulation 1105-2-100, Planning Guidance Notebook, Appendix B, the Feasibility Study will document substantial active involvement by interested government and non-governmental agencies and organizations. The goal of public involvement is to obtain information and views of those with an interest in the Study, so that their comments and concerns receive full consideration in the planning process. Significant public involvement has occurred and been acknowledged for a substantial period of time regarding application for a renewed license of hydropower facilities downstream of the John H. Kerr Dam by the Federal Energy Regulatory Commission (FERC) of Dominion Inc.

A Sponsors' Advisory Committee has been established by the sponsors, the states of Virginia and North Carolina, which includes many of those who participated in the FERC process. The Sponsors' Advisory Committee will provide input to the Sponsors for consideration during decision-making activities affecting the Study. The Sponsors' Advisory Committee includes representatives of federal, state, and local governments, and representatives of businesses and environmental organizations. Primary responsibility of the Sponsors' Advisory Committee, under the John H. Kerr Feasibility Study, is to avoid conflicting interests amongst involved parties, especially potential contractors.

Formal collaboration or coordination between USACE and other agencies is not anticipated during Phase One. However, during Phase One, subject matter specialists, many of whom participated in the FERC process and are members of the Sponsors' Advisory Committee, will be consulted regarding the Study Subjects. Other steps facilitating public involvement will be developed for Phases Two and Three.

Costs for attendance at the Sponsors' Advisory Committee Meetings by members of the Executive Committee, the Project Delivery Team, and individuals responsible for performing work for USACE or for performing in-kind work for the Sponsors shall be included in total project costs and cost shared. Other expenses of the Sponsors' Advisory Committee shall not be included in total project costs or cost shared.

For each of the 9 Study Subjects Tasks identified in the PMP for Phase One, subject matter experts are identified, including USACE employees, the Sponsors, and employees or representatives of other government and non-government organizations, and businesses. Many of these subject matter experts have participated in the Dominion's Inc. FERC license renewal process. The subject matter experts will be consulted for information and advice during the performance of each task. For the purpose of completing Phase One actions, the sponsors will contribute 50% of the total project cost by in-kind services.

TASKS AND COSTS FOR PHASE I

Phase I - Task 1. Downstream Flow Regime and Effects on Riparian Ecosystem

Task Funding Priority [1]: This Task is assigned a funding priority of **HIGH**.

Phase II - Task 1.A: What water levels constitute a flood and what releases from John H. Kerr Reservoir result in those water levels?

Existing data regarding the relationships between releases from John H. Kerr Reservoir and downstream flooding will be gathered and evaluated in the study. Existing methods and tools for study of this subject will also be evaluated. The study will provide information about data, methods, and tools to aid in making recommendations for further study of this subject, which will be considered at the first In-Progress Review.

The relationships between John H. Kerr Reservoir and downstream flooding are influenced by the water releases from the two reservoirs operated by Dominion Inc. immediately downstream of John H. Kerr Reservoir, at Lake Gaston and Roanoke Rapids hydropower projects. These relationships of downstream flow to flooding are also influenced by characteristics of the floodplain.

For the purposes of this study, flooding will be considered to occur when water leaves the Roanoke River channel and enters the floodplain. The amount of daily average flow that causes flooding varies among different reaches of the River. Water from John H. Kerr Reservoir contributes to downstream controlled flooding in two ways:

- Total dispatch of water for a given week – the weekly declaration as affected by the Southeastern Power Association contract and operating guidelines, including flood control; and
- Dispatch of water at any particular time within a given week – by Dominion Inc. or Progress Energy for power generation, or when the USACE supersedes this normal operation for flood control. The apportionment of the weekly declaration among different days of the week by Dominion Inc. or Progress Energy is referred to as within-week peaking.

A primary cause of controlled flooding is the determination of weekly releases, including management of flood events (referred to as "flood operations"), by the USACE. Weekly declarations over a threshold level can result in downstream flooding. Flood operations sometime require the controlled release of water when John H. Kerr Reservoir is above an elevation of 300 feet, mean sea level. During flood operations, the John H. Kerr, Gaston and Roanoke Rapids hydropower

[1] Task Funding Priorities were established to help schedule the completion of task items. All study subjects are important and will be addressed. However, due to funding limitations it was necessary to rank the tasks.

projects are operated in conformance with the existing Water Control Plan for John H. Kerr Dam and Reservoir. This study will examine the John H. Kerr flood operations and their effects. Unless significantly impacted by the flood operations, the Federal Energy Regulatory Commission (FERC) licensed discharges from Lake Gaston and Roanoke Rapids hydropower projects will be beyond the scope of this study.

A secondary cause of controlled flooding is the generation of peaking power by Dominion Inc. and Progress Energy. The magnitude and frequency of discharges for peaking power can cause the River's stage at locations downstream of the Roanoke Rapids hydropower project to exceed channel capacity, and thus water to flow into the floodplain, depending on the magnitude, duration, and pattern of peaking events.

The effects of the peaking flow regime downstream of Roanoke Rapids hydropower project were studied in the FERC re-licensing of Dominion's Inc. projects. The settlement agreement developed during re-licensing will result in additional studies cooperatively managed by Dominion Inc. and resource agencies to further investigate the potential impacts of within-week peaking on the downstream riparian ecosystem. USACE involvement in these additional studies would enhance the John H. Kerr 216 study process for the following reasons:

- *Studying the impacts of growing season floods will involve many of the same indicator species and methods – regardless of whether the cause of the flooding is USACE or Dominion Inc. operations.*
- *The within-week apportionment of the weekly declaration relies on relationships between the USACE, Dominion Inc., and Progress Energy that will likely be examined during the John H. Kerr 216 study.*

Phase 1 - Tasks 1.A.1 - 1.D.3 Subject Matter Specialists:

- Dominion Inc.
- The Nature Conservancy (TNC)
- NC Department of Environment and Natural Resources (NCDENR)
- Division of Water Resources (NCDWR)
- Division of Water Quality (NCDWQ)
- Natural Heritage Program (NCNHP)
- Roanoke River National Wildlife Refuge (RRNWR)
- US Fish and Wildlife Service (USFWS)
- US Army Corps of Engineers (USACE)
- International Paper (IP)
- US Geological Survey (USGS)

Phase I - Task 1.A.1: Identify, Review and Select Flow Model

TEAM PRIORITY RATING [2]: This task is rated as a number one priority by the members of the team.

METHODS: Review literature, communicate with hydrologic modelers by telephone, and participate in discussion with Subject Matter Specialists to determine the model for use in the study. Unless contra-indicated by the review, the Roanoke River Basin Reservoir Operations Model (RRBROM) will be the preferred model – given that it has been used extensively throughout the FERC re-licensing and is already familiar to many stakeholders.

METHOD OF ACCOMPLISHMENT: This task will be completed 100% by USACE.

TIME: 20 person days

ESTIMATED PROJECT COST: $13,000

SPONSORS' IN-KIND WORK: $0

[2] Team Priority Ratings were established by the Resource Teams. The ratings reflect the team's recommendation regarding the proper sequencing of task completion.

Phase I - Task 1.A.2: Identify, Review and Select Flood Model

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Phone conversations and discussions with Subject Matter Specialists and other technical experts in this field shall be conducted. The Flood Model and Digital Elevation Map (DEM), developed by the Nature Conservancy, will be reviewed first, and if acceptable, the consideration of additional data sources will not be necessary.

If the existing flood model is acceptable, the time and estimated cost below will be considerably reduced. Initial review of the flood model will focus on its workings and accuracy. Additional evaluation may be needed later, depending on Tasks 1B, 1C, and 2A, to make sure the flood model provides the necessary outputs for these other tasks.

METHOD OF ACCOMPLISHMENT: This task will be completed 80% by USACE and 20% by NCDWQ.

TIME: 10 person days

ESTIMATED PROJECT COST: $7,000

SPONSORS' IN-KIND WORK: $1,400

NC: $1,400
VA: $0

Phase I - Task 1.A.3: As Needed, Scope Tasks for Development or Revision of Flow and Flood Models

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Communicate with hydrological modelers by telephone and use the input provided by the Subject Matter Specialists to develop an accurate list of tasks and associated costs for development or revision of flow models.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 10 person days

ESTIMATED PROJECT COST: $7,000

SPONSORS' IN-KIND WORK: $3,500

Phase I - Task 1.B. ***How does the flow regime affect downstream agriculture and silviculture operations? When examining the impacts of flooding, consider the frequency, duration, magnitude and timing of flood events.***

The downstream areas that are subject to flooding, and their elevations, will be identified using the flood model and DEM, developed by TNC. TNC also has land ownership data available in digital format. This geospatial data regarding land uses and associated elevations will be combined with the flow and flood models to assess the effects of flow regime on existing land use. Present farming and silviculture practices will be determined by literature review, and by personal interview. It is expected that a non-traditional method will be developed using the existing GIS information to analyze the economic impacts of John H. Kerr's flood operations on hunting, fishing, forestry and farming as well as highway, water supply and sewer infrastructure.

A primary focus of this task will be the effect of downstream flooding on farming and forestry operations – with access by equipment and usability of farm and forest operation roads being a key indicator. Effects of flooding on forest growth and regeneration will be addressed in Task 1.C. International Paper has an electronic database of their forestry operations road network. Additional field data using a global positioning system (GPS) may be needed to further define important roads, and additional information on road grade elevations may be needed. Interviews with local experts (foresters, farmers, and agencies) will be used to identify key roads in the network. These same experts will also be consulted to determine a reasonable recovery time after flooding before roads can be used by equipment. Additionally, input will be sought from experts working on Task 6 – Downstream Flow-based Recreation – so that key access roads for hunting and fishing are included in the GIS road database for later use by that team.

Quantification of flood damage cost and frequency was last developed for the Lower Roanoke River during 1982 to 1983. The existing flood damage curves will be evaluated for present accuracy and adequacy for use in the study of this subject. This will be done by determining if the existing curves identify the land that could currently be covered by flood flows and if the range of flows that the curves are based on reflect the actual flood stages. Aerial photography will be used to determine any significant land use changes that have occurred since 1983. It is expected that new flood damage curves will be developed with input from the Sponsors, foresters and agriculturists. These curves will provide a method for analysis of the possible flood damage to downstream land.

The flood damage curves will be based on elevation data for the point where agricultural or forestlands and access roads are submerged. The flood model developed by TNC may be used. The season of the year will be considered in the flood damage curves in order to determine crop loss and effect on silviculture

operations. The duration and frequency of flooding will also be considered for differential effects on vegetation damage and road usage. The economic loss under the existing conditions will be compared with the economic loss under any revised operation plan that may be studied. The available data will be obtained about present and anticipated land use, land cover, and development in the 100-year flood plain. This data will be evaluated for relevance and adequacy for the study of this subject. If gaps in the relevant data are identified, they will be evaluated for significance, and, if needed, recommendations for obtaining additional data will be developed.

Phase I - Task 1.B.1: Evaluate Adequacy of Existing Imagery and Survey Data

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Conduct a literature review and discussions with local experts to identify existing imagery and survey data. Acquire best available data, analyze for adequacy, and identify data gaps. The initial review will focus on: the data used in the DEM and flood model developed by TNC; land use data assembled by TNC; and available data on forestry and agriculture roads. The road database will be evaluated with input from Task Group 6 for use by that team to evaluate hunting and fishing (boating) access.

METHOD OF ACCOMPLISHMENT: This task will be completed 50% by USACE and 50% by NCDWQ.

TIME: Economist: 14 days Biologist: 14 days

ESTIMATED PROJECT COST: $22,400[3]

SPONSORS' IN-KIND WORK: $11,200

NC: $11,200
VA: $0

[3] *Time and costs may be reduced if existing TNC models are used.*

Phase I - Task 1.B.2: Prepare Scope for Acquisition of Additional Imagery and/or Survey Data as Needed

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Determine appropriate methodology and area of coverage, identify product standards and potential sources. Prepare Scope of Work.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: Economist: 14 days Biologist: 10 person days

ESTIMATED PROJECT COST: $19,200 [3]

SPONSORS' IN-KIND WORK: $9,600

Phase I - Task 1.B.3: Identify analyses to be performed (in Phase 2) Using a GIS Database Containing Best Available Information.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Identify the best available data for the database. Include identification of key roads and an analysis of recovery time for road use following flooding. Consider information that will be needed (e.g. flood damage curves) that will be needed for economic analyses during Phase 3.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 10 person days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,000

C. How does the downstream riparian ecosystem respond to flow and flood regimes - considering the frequency, duration, magnitude and timing of inundation?

Key indicator species of terrestrial and aquatic plants and animals will be identified for evaluating how the various downstream ecotypes respond to inundation. The study task group has identified four lifecycle components that will be evaluated for plants and animals:

- Plants
  1. Effect on mature trees – survival and productivity; dendrochronology
  2. Effect on seedlings –identify survival/mortality thresholds; duration of flooding etc.
  3. Effect on regeneration – germination, re-sprouting, and seed establishment
  4. Effect on seed production – influences recruitment; mast production for foraging

- Animals
  1. Survival – (drowning, water quality)
  2. Feeding
  3. Reproduction
  4. Resting/Roosting

The output from flow and flood modeling described in Task 1A will be used as input data for Species and Community Response models. These will focus on how species and communities respond to flood regimes of various frequencies, durations, magnitudes, and seasonal timings.

In addition to impacts on plant and animal species in the floodplain due to submergence, downstream inundation can also affect riparian flora and fauna by producing changes in water quality. The issue of how water quality is influenced by flow and flood regimes will be directly addressed in Task 2A. Task 1C will address how the riparian species and communities respond to changes in water quality. The effect of water quality on the four animal and plant lifecycle components listed above will be an additional variable to include in the development of Species and Community Response Models, with output from the water quality model developed in Task 2A providing input.

Available data related to this subject will be summarized and catalogued, and recommendations for further data collection will be prepared. Existing methods and tools for analysis and study of this subject will be identified.

An array of flow conditions will be developed for the models, representing high and low frequency flooding, and high, normal and low flow antecedent conditions, to allow for analysis of flood events under various operational

scenarios. These operational scenarios for John H. Kerr Dam and Reservoir will include altering the flood control operation, and altering the guide curve. It is expected that some existing Species and Community Response models can be adapted to local site conditions, and that other models will need to be developed. The estimates of time and cost required for doing this work are based on developing generic scopes of work for both adapting the existing models and developing new models.

Depending on the results of the studies conducted during Task 1C, one potential alternative outcome would be the establishment of an adaptive management process for further testing and modification of John H. Kerr Reservoir operations with respect to downstream flooding and the riparian ecosystem.

Phase I - Task 1.C.1: Evaluate Adequacy of Existing Species and Community Response Models

TEAM PRIORITY RATING: This task is rated as a number two priority by the members of the team.

METHODS: Conduct a Literature review and discussions with experts to identify key indicator species -including a review of those identified by the Terrestrial Ecosystems Work Group during FERC re-licensing of the Dominion Inc. projects, as well as other species to be determined. Existing Species and Community Response models will be reviewed to determine what additional information needs to be developed. Acquire best available data, analyze for adequacy, and identify data gaps.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 25 person days and $10,000 for acquisition

ESTIMATED PROJECT COST: $30,000

SPONSORS' IN-KIND WORK: $15,000

Phase I - Task 1.C.2: Develop a Request for Proposals (RFP) to Conduct a Detailed Literature Review of How the Selected Species and Communities Respond to Environmental Changes

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Identify the scope of habitat variables and species of consideration. Identify product standards and potential investigators, and prepare a Scope of Work. This task will lead into a two-part effort under Phase 2 of the Project. The first part will be in response to this RFP and will produce a detailed literature review of how the selected species and communities respond to habitat changes, including preliminary identification of key variables. The Task Group will review this work product during Phase 2 and develop RFP's for the second part of the Phase 2 work – conducting the studies needed to develop or modify Species and Community Response models. Costs are only for Phase 1 and based on developing the RFP for 15 species and communities, may involve more or less.

METHOD OF ACCOMPLISHMENT [4]: This task was determined to be Phase II work.

TIME: 10 person days

ESTIMATED PROJECT COST: $0

SPONSORS' IN-KIND WORK: $0

Phase I - Task 1 Total Cost: $106,600 [5]
Sponsors' In-kind Work: $44,700

[4] *This task and costs will be included in the Phase II Scope of Work.*
[5] *Time and costs may be reduced if existing TNC models are used.*

Phase I - Task 2. Water Quality

Task Funding Priority: This Task is assigned a funding priority of **HIGH**.

Phase I - Task 2 A. How does flow regime affect downstream water quality in floodplain areas, tributaries, and the main river channel?

Existing methods and tools for determining water quality changes will be identified and evaluated. It is expected that significant baseline water quality data is available for the study area. However, it is also expected that some additional water quality data collection will be required, and the estimates of time and cost for this work are based on this.

The tasks under this item may link to methods and tools developed as part of Item 1, including: floodplain water level gauges; the Roanoke River Basin Reservoir Operations Model (1.A.2); and an inundation model developed by the Nature Conservancy (1.B). Additional methods and tools will need to be developed that relate inundation to water quality, as influenced by timing and duration.

Available data related to this subject will be summarized and catalogued, and recommendations for further data collection will be prepared. Existing methods and tools for analysis and study of this subject will be prepared.

Existing data will be gathered regarding discharge practices and water quality releases from John H. Kerr Dam under various flow conditions, impacts on floodplains due to adjacent land use, changes in water quality resulting from floodplain inundation, and the effects of drainage of the flood plains to the river. Water quality parameters to consider should be dissolved oxygen (DO), temperature, nutrients, chlorophyll a, chemical oxygen demand (COD), biological oxygen demand (BOD), and sediment oxygen demand (SOD). Also is higher resolution topography of the floodplain needed? This data will be evaluated for relevance and adequacy for the study of this subject. If gaps in the relevant data are identified, they will be evaluated for significance, and, if needed, recommendations for obtaining additional data will be developed.

Any modeling or monitoring required should be able to handle ramp down quantity and duration for any season. This modeling and monitoring should be able to detect DO concentrations and other parameters concentrations at various points in the river and floodplain, address optimum DO for migrating fish, assess assimilative capacity, and determine impacts to water quality standards. The modeling should also be able to assess rapid fluctuations in reservoir releases and subsequent river flows, and the model release maximum should be higher than under existing operations. Finally the up and downstream boundaries of the model need to be determined and if tasks A and B need to be combined.

Phase I - Tasks 2.A.1 – 2.C.3: Subject Matter Specialists:

- Dominion Inc.
- NC Division of Water Quality (NCDWQ)
- NC Wildlife Resources Commission (NCWRC)
- Roanoke River National Wildlife Refuge (RRNWF)
- US Army Corps of Engineers Wilmington District (USACE)
- US Fish and Wildlife Service (USFWS)
- US Geological Survey (USGS)
- VA Department of Game and Inland Fisheries (VADGIF)
- VA Department of Environmental Quality (VADEQ)
- The Nature Conservancy (TNC)
- Weyerhaeuser
- Other agencies as appropriate

Phase I - Task 2.A.1: Evaluate Adequacy of Existing Water Quality Data and Prepare Recommendations for Further Data Collection as Needed

TEAM PRIORITY RATING: This task is rated as a number two priority by the members of the team.

METHODS: Consult with Sponsors and decide what data will be needed to answer the questions that will lead to an adequate description and discussion of water quality issues in the Feasibility Report.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 60% by NCDWQ and 40% by USACE.

TIME: 10 person days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,800

NC: $4,800
VA: $0

Phase I - Task 2.A.2: Prepare Scope for Collection of Water Quality Data as Needed

TEAM PRIORITY RATING: This task is rated as a number two priority by the members of the team.

METHODS: Communicate with water quality experts by telephone and use the input provided by the Subject Matter Specialists to develop an accurate list of tasks and associated costs. Data collected needs to be in appropriate areas such as in critical habitat areas (spawning and nursery) in the entire river for anadromous fish and the data needs to be adequate for modeling to predict DO conditions in the floodplain and river under various flow, temperature, and duration scenarios.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 50% by NCDWQ and 50% USACE.

TIME: 10 person days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,000

NC: $4,000
VA: $0

Phase I - Task 2.A.3: Prepare Scope for Development or Revision of Water Quality Models related to flood plain flooding

TEAM PRIORITY RATING: This task is rated as a number two priority by the members of the team.

METHODS: Communicate with hydrological modelers by telephone and use the input provided by the Subject Matter Specialists to develop an accurate description of tasks and estimated associated costs. Include in the discussions conditions such as why the DO sag in the lower river does not flush out as expected.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 60% by NCDWQ and 40% USACE.

TIME: 50 days

ESTIMATED PROJECT COST: $40,000

SPONSORS' IN-KIND WORK: $24,000

NC: $24,000
VA: $0

Phase I - ***Task 2 B. How do downstream flows maintained by releases from John H. Kerr Reservoir affect water quality in the river channel between Roanoke Rapids and the mouth of the river?***

The FERC license for the Lake Gaston and Roanoke Rapids hydroelectric projects requires minimum flows that vary by month. The North Carolina Division of Water Quality (NCDWQ) uses these minimum flows to determine assimilative capacity in the Roanoke River and establish effluent limits for point source discharges. However, the water quality model used by NCDWQ does not specifically address flood plain flooding/re-entry, fluctuating flows, and coastal plain hydrology. An agreement between the USACE, the North Carolina Wildlife Resources Commission (NCWRC), and Dominion Inc. also sets flow targets for the spring run of diadromous fish species.

This section of the Water Quality study item will focus on downstream water quality in the river channel to develop a model that can be linked to the reservoir operations flow model developed in 1.A.2. The existing assimilative capacity model ends at Hamilton and additional modeling should not only consider this area but include factors such as wind and lunar tides and saltwater intrusion. The existing water quality monitoring stations will be examined and water quality experts within NCDWQ will be consulted. The anticipated outcome is a data collection approach and flow related model that can be used to evaluate reservoir operations and make decisions regarding assimilative capacity through the river mouth for existing and potential future dischargers. Assimilative capacity should consider temperature, flow, and DO inputs from floodplain drainage.

Phase I - Task 2.B.1: Evaluate Adequacy of Existing Water Quality and Stream Flow Gauging Station Data

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Meet with NCDWQ, USGS, and other Subject Matter Specialists and use their input. Consider whether locations and lengths of record from existing stations are adequate or if additional data is needed.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 60% by NCDWQ and 40% USACE.

TIME: 10 days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,800

NC: $4,800
VA: $0

Phase I - Task 2.B.2: Prepare Scope for Collection of Water Quality Data as Needed

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Communicate with water quality experts by telephone and use the input provided by the Subject Matter Specialists to develop an accurate list of tasks and associated costs. Data collected needs to be in appropriate areas such as in critical habitat areas (spawning and nursery) in the entire river for anadromous fish and the data needs to be adequate for modeling to predict DO conditions in the river under various flow, temperature, and duration scenarios.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 50% by NCDWQ and 50% USACE.

TIME: 10 person days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,000

Phase I - Task 2.B.3: Prepare Scope for Development or Revision of Downstream Water Quality Models

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Meet with NCDWQ, USGS, and other Subject Matter Specialists to develop an accurate description of tasks and estimated associated costs. Assure that model can be linked to reservoir operations model.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 60% by NCDWQ, 40% USACE.

TIME: 50 days

ESTIMATED PROJECT COST: $40,000

SPONSORS' IN-KIND WORK: $24,000

NC: $24,000
VA $0

Phase 1 - ***Task 2 C: Evaluate the water quality of the release from the John H. Kerr Dam impoundment through the Roanoke Rapids tailrace.***

The turbines at John H. Kerr Dam have recently been modified to improve dissolved oxygen (DO) concentrations in the water released from the powerhouse. Also, the replacement of the six main turbines will begin in the summer of 2004, and at least 3 of the 6 will be aspirating turbines. This is an attempt to address long-standing concerns about water quality standards and aquatic biota in Lake Gaston downstream of the discharge. A DO gage was installed by USGS in early December 2003 to assess if additional measures will be needed to meet water quality goals. Real-time data from this gage is available at the following web site:

http://waterdata.usgs.gov/va/nwis/uv?dd_cd=08&format=gif&period=7&site_no=02079500

An additional concern is the impact the peaking operations (rapid fluctuations in discharge) at John H. Kerr and the water quality in the tailrace have on the downstream water quality through the Roanoke Rapids tailrace.

Phase I - Task 2.C.1: Evaluate Adequacy of Existing Water Quality Data and Prepare Recommendations for Further Data Collection as Needed

TEAM PRIORITY RATING: This task is rated as a number three priority by the members of the team.

METHODS: Collect and review existing water quality data, potential sources include the Subject Matter Specialists. Consult with Sponsors, and these specialists to determine data requirements and decide what data will be needed to answer the questions that will lead to an adequate description and discussion of water quality issues in the Feasibility Report.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 60% by NCDWQ and 40% USACE.

TIME: 10 person days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,800

NC: $4,800
VA: $0

Phase I - Task 2.C.2: Prepare Scope for Collection of Water Quality Data as Needed

TEAM PRIORITY RATING: This task is rated as a number three priority by the members of the team.

METHODS: Develop Monitoring Plan Scope of Work with input from the Subject Matter Specialists.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 50% by NCDWQ and 50% USACE.

TIME: 10 days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,000

NC: $4,000
VA: $0

Phase I - Task 2.C.3: Prepare Scope for Development of Water Quality Models related Reservoir releases

TEAM PRIORITY RATING: This task is rated as a number three priority by the members of the team.

METHODS: To accomplish this task, modeling of the releases would be required. This would require not only release data, but also data from the impoundments from John H. Kerr Reservoir through Roanoke Rapids tailrace. Communicate with hydrological modelers by telephone and use the input provided by the Subject Matter Specialists to develop an accurate description of tasks and estimated associated costs

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 60% by NCDWQ and 40% USACE.

TIME: 50 days

ESTIMATED PROJECT COST: $40,000

SPONSORS' IN-KIND WORK: $24,000

NC: $24,000
VA: $0

Phase I - 2 Total Cost: $168,000
Sponsors' In-kind Work: $98,400

Phase I - Task 3. Sedimentation and Channel Morphology

Task Funding Priority: This Task is assigned a funding priority of **LOW.**

Phase I - Task 3 A. How does the managed flow regime affect the channel morphology of the main river channel and the tributaries?

The past, present, and future behavior of the Roanoke River will be investigated using tools in the following disciplines: hydrology, sedimentation, channel geometry, and water management operations. Data necessary to determine river trends (qualification and quantification, both spatial and temporal) and associated impacts in the Roanoke River Basin will be identified. The study area will include the Roanoke River below the Fall Line and dams downstream to just below Williamston, NC; other sites for possible study as Reference Rivers are the lower Tar and Meherrin Rivers. The period of time required for these investigations will depend largely on the availability and interpretation of existing data and securing the services of specific experts. The goal of this task group is to determine the rates of bank erosion (retreat), the volume of sediment deposition on the floodplain and to determine whether increases in erosion and deposition can be linked to dam operations associated with, the flood control project.

Flow release schedules by dam operations are not compatible for the maintenance of stable bed and banks of the river (dynamic equilibrium). Equilibrated systems transport and store sediment such that the regime fluvial geomorphic form of the river is maintained. The erosion, entrainment, transport and deposition of sediment will be studied. Frequent and prolonged growing season floods may cause erosion of and/or suppression of vegetation on the banks eliminating forage and cover for fish and other aquatic organisms when the banks are partially or wholly inundated. Lack of bank vegetation may result in decreased bank stability and increased erosion. Bank erosion may also provide for an increase in suspended sediment load giving rise to water quality concerns, lead to increased over bank deposition downstream (levees and floodplains), and aggradations of the channel. Existing bottomland hardwood (and cypress-tupelo) plant communities are negatively impacted by increased sediment deposition.

Phase I - Task 3 A 1 - 3 B 4: Subject Matter Specialists

- US Geological Survey (USGS)
  - Reston, Virginia
  - Raleigh, North Carolina
  - Baltimore, Maryland
- Roanoke River National Wildlife Refuge (RRNWR)
- US Army Corps of Engineers, Wilmington District (USACE)
- NC Division of Water Quality (NCDWQ)
- Dominion Inc.
- Riverine Geomorphologists, Sedimentation Expert (as needed)

Phase I - Task 3.A.1: Establish a database on available information regarding hydrology channel morphology, sedimentation dynamics and water management operations and evaluate its adequacy.

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Contact Sponsors and other appropriate parties to develop an inventory of available data by type, including: hydrologic, channel geometric, hydraulic, sediment, land use, and bank erosion. Data will be consolidated and evaluated for its usefulness in the John H. Kerr Dam and Reservoir Section 216 study. Contact USGS-National Center Research District Offices (in Raleigh and Baltimore), USACE, and NCDOT for existing data on channel morphology measurements, discharge, and stage data. Contact USFWS Roanoke River National Wildlife Refuge and Dominion Inc. for existing bank erosion data. Contact Phil Townsend (University of Maryland) for GIS database information.

METHOD OF ACCOMPLISHMENT: This task will be completed 100% by USACE.

TIME: 30 days

ESTIMATED PROJECT COST: $20,000

SPONSORS' IN-KIND WORK: $0

Phase I - Task 3.A.2: Prepare Scope(s) of work for collection of appropriate data to fill gaps required to determine impacts John H. Kerr Dam and Reservoir may have on Channel Morphology.

TEAM PRIORITY RATING: This task is rated as a number four priority by the members of the team.

METHODS: Consult with Sponsors and other appropriate parties and subject matter experts to determine data needs. Probable data needs and specific methods include: Development of a GIS map showing the area affected by John H. Kerr Dam and Reservoir, including the boundary of the study area, river reaches, and tributaries, problem areas, number and type of problems (increased channel width, abrupt increases in bed slope, reaches of low bed slope, cutoffs and changes in channel alignment), soil classification maps, and aerial photographs. Classifying historical trends of channel behavior within study area boundary, during the engineering time scale not geological time. Determination of historic rates of erosion and dam release flow regime and the collection of dendrogeomorphic (tree-ring) data. Determine current erosion rates using erosion pins and other methods. Determine appropriate reference reaches. Temporal analysis of geometric data and compare with reference streams. Inventory available data for the lower Roanoke River by type: hydrologic, channel geometric, hydraulic, sedimentary, land use and bank erosion from on going studies (contact USGS, Dominion Inc. and USFWS-RRNWR). Conduct retrospective analysis of other studies, as well as collecting, organizing and processing the existing prototype data including gage data, surveys, sediment concentrations and bed material gradation.

METHOD OF ACCOMPLISHMENT: This task will be completed 100% by USACE.

TIME: 15 days

ESTIMATED PROJECT COST: $12,000

SPONSORS' IN-KIND WORK: $0

Phase I - Task 3 B: How does the managed flow regime affect the movement of sediment in the main river channel, its tributaries, and throughout the floodplain?

Severe reduction in peak flows after the dams became operational has greatly reduced normal (coarse grained) levee deposition. Back swamp sedimentation has increased, slowly rendering the riparian floodplain areas more homogenous and compromising topographic diversity. Loss of topographic diversity will potentially lead to substantial loss of floodplain ecosystem diversity on the lower river. Bank erosion from prolonged low high flows and high low flows result in increased sedimentation, negatively impacting water quality and aquatic organisms.

Phase I - Task 3 B 1: Establish and evaluate a database on available information regarding sedimentation dynamics within the lower basin relative to hydrologic and water management operations.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Contact Sponsors and other appropriate parties to determine what sediment data is available evaluate data for adequacy, and identify data gaps required to understanding historical behavior of the river, trends in aggradations/degradation under the control of John H. Kerr Dam and Reservoir.

METHOD OF ACCOMPLISHMENT: This task was determined to be Phase II work.

TIME: 10 days

ESTIMATED PROJECT COST: $0 [6]

SPONSORS' IN-KIND WORK: $0

[6] *This task and costs will be included in the Phase II Scope of Work.*

Phase I - Task 3 B 2: Determine short-term bank erosion processes that may be linked to artificial prolongation of discharge surges and other artificial flow scenarios.

TEAM PRIORITY RATING: This task is rated was not rated by the members of the team.

METHODS: Consult subject matter specialists to determine the number and frequency of data collection efforts and the cost to collect and analyze the data. Determine feasibility of shear stress analyses with DOPPLER technology which gives velocity and bottom profile information along selected reaches during a few of the more extreme hydropower discharge hydrographs if sediment appropriate data are not available.

METHOD OF ACCOMPLISHMENT: This task was determined to be Phase II work.

TIME: 2 days

ESTIMATED PROJECT COST: $0 [7]

SPONSORS' IN-KIND WORK: $0

[7] *This task and costs will be included in the Phase II Scope of Work.*

Phase I - Task 3 B 3: Determine adequacy of sedimentation studies currently in progress on the lower Roanoke River in addressing the impacts the operations of John H. Kerr on sedimentation dynamics.

TEAM PRIORITY RATING: This task is rated as a number two priority by the members of the team.

METHODS: Consult with Sponsors (specifically Phil Townsend and Cliff Hupp) and others as appropriate to discuss adequacy of current NSF project proposed results.

METHOD OF ACCOMPLISHMENT: This task will be completed 100% by USACE.

TIME: 2 days

ESTIMATED PROJECT COST: $2,000

SPONSORS' IN-KIND WORK: $0

Phase I - Task 3.B.4: Prepare Scope for the Development of a Model(s) that is able to predict and evaluate sediment transport under different flow regimes.

TEAM PRIORITY RATING: This task is rated as a number three priority by the members of the team.

METHODS: Consult with fluvial riverine geomorphologists, sedimentation experts and hydrologists and use the input provided by the Subject Matter Specialists to develop an accurate description of data and effort necessary to develop a model capable of sediment transport prediction under different flow regimes.

METHOD OF ACCOMPLISHMENT: This task will be completed 100% by USACE.

TIME: 5 days

ESTIMATED PROJECT COST: $5,000

SPONSORS' IN-KIND WORK: $0

Phase I - Task 3 Total Cost: $39,000
Sponsors' In-kind Work: $0

Phase I - Task 4. Reservoir Resources

Task Funding Priority: This Task is assigned a funding priority of **MEDIUM**.

Task 4 A. What Future Patterns of Shoreline Protection and Development on John H. Kerr Dam and Reservoir Would Best Serve the Needs of All Stakeholders? How Could That Protection and Development Best be assured?

The Master Plan for John H. Kerr Dam and Reservoir Section 216 was last revised in August 1980. A revision date has not been established for the Master Plan. Potential changes in project operations as a result of the John H. Kerr 216 Study may be inconsistent with the current Master Plan. There should be ongoing monitoring to determine whether proposed changes as a result of the John H. Kerr 216 Study necessitate changes to the Master Plan.

PHASE I - TASKS 4.A.1 – 4.B.4 Subject Matter Specialists:

- NC Department of Parks and Recreation (NCDPR)
- NC Wildlife Resources Commission (NCWRC)
- Regional Partnership of Local Government
- Roanoke River Basin Association (RRBA)
- Southeastern Power Administration (SEPA)
- US Army Corps of Engineers, Wilmington District (USACE)
- VA Department of Conservation & Recreation (VADCR)
- VA Department of Game and Inland Fisheries (VADGIF)

Phase I - Task 4.A.1: Review the August 1980 Master Plan Including all Appendices (e.g. Shoreline Management Plan) Developed for John H. Kerr Reservoir and Identify how Shoreline Erosion, Reservoir Fisheries and Wildlife Resources, Timber Resources, Recreational Use, Real Estate Values and the Local Economy are Likely to be Affected by the John H. Kerr 216 Study.

TEAM PRIORITY RATING: This task is rated as a number four priority by the members of the team.

METHODS: Review the 1980 John H. Kerr Dam and Reservoir Master Plan and summarize the issues within the Master Plan that are related to the resource elements listed above being studied in the John H. Kerr 216 Study. This process will help to ensure that the John H. Kerr 216 Study and updated Master Plan support each other. **Note:** During Phase 2 of the John H. Kerr 216 Study process, review the Master Plan and recommend revisions to the Master Plan to insure consistency between the operation guidelines and the Master Plan.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 75% by USACE and 25% by VADGIF [8].

TIME: Planner: 4 days

ESTIMATED PROJECT COST: $9,600

SPONSORS' IN-KIND WORK: $2,400

NC: $0
VA: $2,400

[8] Sponser may inlist the aid of local government to coplete this task.

Phase I - Task 4.A.2: Develop Scope of Work to Inventory Reservoir Shoreline Condition and Land Use Practices

TEAM PRIORITY RATING: This task is rated as a number five priority by the members of the team.

METHODS: Inventory available aerial photography for the study area and develop plan to accomplish ground truthing. The purpose is to ultimately identify areas where vegetation has been cleared and locate structures such as docks, piers and bulkheads. The task would also include delineation of the following: areas with existing and potential erosion problems, areas with high concentrations of shoreline structures, and areas with significant resources that may be vulnerable to clearing or other changes in land use. The data collected in this task would be linked to a GIS database. A cost estimate for collecting the base information using LIDAR would be developed by the team. Aerial photography (scale: 1 in. = 400 feet or less) would be needed to determine land use surrounding the reservoir. The cost of converting the LIDAR data to digital 2-foot contour maps would be developed.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 75% by USACE, 12.5% by VADGIF, and 12.5% by NCDWQ.

GIS Specialist: 1 week

ESTIMATED PROJECT COST: $4,000

SPONSORS' IN-KIND WORK: $1,000

NC: $500
VA: $500

Phase I - Task 4.A.3: Inventory and compare existing local government land use regulations on lands in close proximity to the reservoir.

TEAM PRIORITY RATING: This task is rated as a number nine priority by the members of the team.

METHODS: Review states laws and compare local government (Warren, Vance and Granville Counties in NC and Halifax, Charlotte and Mecklenburg Counties in Virginia) and town and cities comprehensive plans and land use regulations. Similarities and differences in plans and regulations should be identified as well as planned future patterns of development and resource protection.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 50% byVADGIF and 50% NCDWQ[9].

TIME: Planner: 2 days

ESTIMATED PROJECT COST: $1,600

SPONSORS' IN-KIND WORK: $1,600

NC: $800
VA $800

[9] Sponser may inlist the aid of local government to coplete this task.

Phase I - TASK 4.A.4: Develop a scope of work to identify current recreational facilities and use and determine current and future needs as well as the relationship between reservoir water management and recreational use..

TEAM PRIORITY RATING: This task is rated as a number three priority by the members of the team.

METHODS: Review existing public recreational facilities and available use data for the reservoir and determine its adequacy. This review should include bank fishing areas, boating access areas, day use areas, camping facilities, wildlife hunting areas, etc. Consult local governments, state and local agencies from North Carolina and Virginia, university professionals and non-governmental organizations involved in recreational planning and development.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 75% by VADGIF and 25% by NCDWQ.

TIME: VA and NC Recreational Planner: 1 week

ESTIMATED PROJECT COST: $4,000

SPONSORS' IN-KIND WORK: $4,000

NC: $1,000
VA: $3,000

Phase I - ***Task 4 B. How does Water Management in John H. Kerr Reservoir Affect Shoreline Erosion, Reservoir Fisheries and Wildlife Resources, Timber Resources, Recreational Use, Real Estate Values and the local economy?***

Water levels in the reservoir have been identified as an important concern for reservoir fisheries and wildlife management, recreational use, stability of the lakeshore, timber resources, property values and the local economy. Improved understanding of the relationship between these variables and lake levels will allow them to be considered along with other factors in evaluating any potential changes in reservoir operations. The reservoir operations model will be an important link between inflow/outflow and water levels, which in turn affect reservoir resources.

Phase I - Task 4.B.1: Develop a Scope of Work to Evaluate the Relationship Between Reservoir Water Management and Lake Fisheries.

TEAM PRIORITY RATING: This task is rated as a number two priority by the members of the team.

METHODS: Consult agencies from North Carolina and Virginia, university professionals and non-governmental organizations involved in fisheries management and research. Evaluate adequacy of existing species and community response models and identify data gaps. Consideration should be given as to how reservoir water management impacts entrainment and impingement of fish through the dam.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 100% by VADGIF.

TIME: Fisheries Biologist 1 weeks

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $8,000

NC: $0
VA: $8,000

Phase I - Task 4.B.2: Develop a Scope of Work to Evaluate the Relationship Between Reservoir Water Management and Real Estate Values.

TEAM PRIORITY RATING: This task is rated as a number eight priority by the members of the team.

METHODS: Consult local governments and real estate interests. Consider both the actual lake level, as well as the amount of variation.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 50% NCDWQ and 50% VADGIF [10].

TIME: Planner: 1 week

ESTIMATED PROJECT COST: $4,000

SPONSORS' IN-KIND WORK: $4,000

NC: $2,000
VA: $2,000

[10] Sponser may inlist the aid of local government to coplete this task.

Phase I - Task 4.B.3: Develop a Scope of Work to Evaluate the Relationship Between Reservoir Water Management and Shoreline Erosion.

TEAM PRIORITY RATING: This task is rated as a number seven priority by the members of the team.

METHODS: Consult agencies from North Carolina and Virginia, university professionals, non-governmental organizations and USACE staff involved in shoreline erosion and stability.

METHOD OF ACCOMPLISHMENT: This task will be accomplished 75% by USACE, 12.5% by VADGIF, and 12.5% by NCDWQ.

TIME: Geomorphologist: 2 weeks

ESTIMATED PROJECT COST: $10,000

SPONSORS' IN-KIND WORK: $2,500

NC: $1,250
VA: $1,200

Phase I - Task 4.B.4: Develop a Scope of Work to Evaluate the Relationship Between Reservoir Water Management and Timber Resources on Project Lands.

TEAM PRIORITY RATING: This task is rated as a number ten priority by the members of the team.

METHODS: Consult agencies from North Carolina and Virginia, university professionals, non-governmental organizations and USACE staff involved in timber resources. Evaluate adequacy of existing species and community response models and identify data gaps.

METHOD OF ACCOMPLISHMENT: This task will be accomplished 75% by USACE, 12.5% by VADGIF, and 12.5% by NCDWQ.

TIME: Forester: 2 weeks

ESTIMATED PROJECT COST: $10,000

SPONSORS' IN-KIND WORK: $2,500

NC: $1,250
VA: $1,200

Phase I - Task 4.B.5: Develop a Scope of Work to Evaluate the Relationship Between Reservoir Water Management and Wildlife.

TEAM PRIORITY RATING: This task is rated as a number six priority by the members of the team.

METHODS: Consult agencies from North Carolina and Virginia, university professionals, non-governmental organizations and USACE staff involved in wildlife management and research. Evaluate adequacy of existing species and community response models and identify data gaps.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 100% by VADGIF.

TIME: Wildlife Biologist: 2 weeks

ESTIMATED PROJECT COST: $10,000

SPONSORS' IN-KIND WORK: $10,000

NC: $0
VA: $10,000

Phase I - ***Task 4 C. How does Hydropower Generation at John H. Kerr Reservoir, Lake Gaston and Roanoke Rapids Affect Shoreline Erosion, Timber Resources, Reservoir Fisheries and Wildlife, Recreational Use, Real Estate Values and the local economy at John H. Kerr Reservoir?***

Hydropower generation has been identified as an important concern for reservoir fisheries and wildlife management, timber resources, recreational use, shoreline stability, property values and the local economy. Improved understanding of the relationship between these variables and power generation will allow them to be considered along with other factors in evaluating any potential changes in reservoir operations. The reservoir operations model will be an important link between inflow/outflow and water levels - that in turn affect reservoir resources.

Phase I - Task 4.C.1: Develop a Detailed Study Plan to Determine Impacts to Recreation, Lake Fisheries, and Shoreline Vulnerability With Various Scenarios of Hydropower Generation (considering economic and ecological standards).

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Consult agencies from North Carolina and Virginia involved in fisheries management and recreation, along with adjacent property owners' organizations and businesses involved in lake recreation. Review available models and assessment methodologies and develop a scope of work to assess effects of various hydropower generation schemes on reservoir recreation, fisheries and wildlife populations, timber resources, property values, the local economy, and shoreline stability.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 100% USACE[11].

TIME: Planner: 2 weeks Economist: 1 weeks

ESTIMATED PROJECT COST: $12,000

SPONSORS' IN-KIND WORK: $0

Phase I Task 4 Total Cost: $73,200
Sponsors' In-kind Work: $36,000

[11] This task may be completed by private industry under contract to USACE.

Phase I - Task 5. Downstream Flow Based Recreation

Task Funding Priority: This Task is assigned a funding priority of **MEDIUM**.

Phase I - Task 5 A. What impacts do releases from John H. Kerr Dam and Reservoir have on motorized and non-motorized boating, fishing, camping, and hunting in the areas on and along the Roanoke River in North Carolina, downstream of Roanoke Rapids? What impacts do releases have on nature-based recreation (including aesthetics, wildlife educational opportunities, nature photography and bird watching) in the river study area? Existing data will be reviewed, and new data collected, so that economic benefits of downstream river-related recreation can be evaluated. One product of the study will be a model to evaluate recreation use under different flow regimes.

PHASE I - TASKS 5 A 1 - 5 A 5 Subject Matter Specialists:

- NC Division of Water Resources (NCDWR)
- NC Wildlife Resources Commission (NCWRC)
- The Nature Conservancy (TNC)
- US Army Corps of Engineers, Wilmington District (USACE)
- VA Department of Conservation & Recreation (VADCR)
- Roanoke River Partners (RRP)
- Roanoke River National Wildlife Refuge (RRNWR)

Phase I - Task 5 A 1: Review and summarize existing data related to downstream recreational uses.

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Study team will: (1) Compile a bibliography of information on recreational users of the lower Roanoke River that NCWRC has available; (2) develop a list of outfitters and describe the data available for platform and paddle trail users; (3) review and describe the NCWRC database of hunting permits for the lower Roanoke River, as well as the database of licenses issued for hunting and fishing guides; and (4) examine the NC Division of Parks and Recreation State Comprehensive Outdoor Recreation Plan (SCORP) to see if regional data exists for different types of use.

METHOD OF ACCOMPLISHMENT: This task will be completed 100% by NCWRC. This Task has been completed.

TIME: 3 days

ESTIMATED PROJECT COST: $2,400

SPONSORS' IN-KIND WORK: $2,400

NC: $2,400
VA: $0

Phase I - Task 5 A 2 TASK: Develop a Request for Proposals (RFP) to review and screen various approaches for analyzing the effect of different flow regimes on recreational use.

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: The analysis will focus on fishing, hunting, camping, and nature observation as the best indicators of the effect of flow management alternatives on downstream recreation. This task will lead into a two-part effort under Phase 2 of the Project. The first part will be in response to this RFP and will produce a review of the various approaches. The approaches reviewed will include surveys of users, interviews with experts (guides, outfitters, NCWRC and USFWS staff), and analysis of carrying capacity at different flows (e.g. area of hunting land available at different flow levels). The study team will review this work product during Phase 2 and recommend a study approach for approval by the Executive Committee. After approval, an RFP will then be developed for the second part of the Phase 2 work – performing the analysis using the approach selected during step 1 of Phase 2.

METHOD OF ACCOMPLISHMENT: This task will be completed 100% by NCDWR. This task has been completed.

TIME: 2 days

ESTIMATED PROJECT COST: $1,600

SPONSORS' IN-KIND WORK: $1,600

NC: $1,600
VA: $0

Phase I - Task 5 A 3 TASK: Develop a Scope of Work for analyzing the effect of different flow regimes on downstream recreation using an approach based on geographic information.

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: The study team will prepare a Scope of Work that uses information on access roads and recreational areas (hunting, camping, boat access) in a GIS format. This geographic information will be examined in the context of what areas are flooded under different flow regimes. An enhanced scope of work will expand the analysis to include a GIS-enhanced Delphi exercise with a group of experts – guides, outfitters, NCWRC enforcement officers, and National Wildlife Refuge staff.

METHOD OF ACCOMPLISHMENT: This task will be completed 100% by VADPR. This Task has been completed.

TIME: 2 days

ESTIMATED PROJECT COST: $1,600

SPONSORS' IN-KIND WORK: $1,600

NC: $0
VA: $1,600

Phase I - Task 5 A 4: Develop a scope of work to produce a processing tool / model that merges the hydrology / flood model with a qualifier and quantifier of recreational use for fishing, hunting, camping and nature-based recreation.

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: The study team will prepare a Scope of Work to produce this model / processing tool during Phase 2 of the Project. The objective is to allow consistent, relatively simple evaluation of recreational impacts in conjunction with different hydrology simulations. This tool should be applicable to the efforts of the Integration Task group.

METHOD OF ACCOMPLISHMENT: This task will be completed 100% by USACE. This Task has been completed.

TIME: 2 days

ESTIMATED PROJECT COST: $1,600

SPONSORS' IN-KIND WORK: $0

Phase I - Task 5 A 5 <u>One meeting of the study team will be needed to allow review and finalization of the RFP and Scopes of Work (one day, 2 federal and 3 state employees)</u>.

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHOD: Scope of Work will be reviewed at the final Team Meeting.

METHOD OF ACCOMPLISHMENT: This Task will be accomplished 40% USACE and 60% NCDWR.

ESTIMATED PROJECT COST: $4,000

SPONSORS' IN-KIND WORK: $2,400

NC: $2,400
VA: $0

Phase I - Task 5 Total Project Cost: $11,200
Sponsors' In-Kind Work: $8,000

Phase I - Task 6. Salt Wedge/ Salt Water Intrusion

Task Funding Priority: This Task is assigned a funding priority of **LOW**.

Phase I - Task 6 A. How is the location of the salt wedge in the lower river affected by different releases from the reservoir?

Existing data regarding the relationships among the releases from John H. Kerr Reservoir, Lake Gaston and Roanoke Rapids Hydropower Projects and the salt wedge dynamics in the Lower Roanoke River will be gathered and evaluated in the study. In addition, there are other weather related factors that have been found to have an influence in the salt wedge dynamics in the Lower Roanoke River. Weather data (winds, drought/drought operations, and hurricanes) will also be gathered and analyzed. The study will provide information about data, methods and tools to aid in making recommendations for further study of this subject, which will be considered at he first IPR.

The relationships among John H. Kerr Reservoir, Lake Gaston and Roanoke Rapids Hydropower Projects and the salt wedge dynamics in the Lower Roanoke River downstream may be influenced by both project operations and weather factors.

For the purposes of this Study, salt-water wedge will be considered when oceanic/marine seawater migrates from the Albemarle Sound into the Lower Roanoke River. Influences can be; (1) the lack of river flow (drought/drought operations) (2) directional winds-weather and (3) hurricanes.
The first, drought operations related, may cause salt-water intrusion due to the lower water release from Roanoke Rapids Dam. The lower water flow from the Roanoke Rapids Hydropower plant may be insufficient to impede the salt-water migration upstream.

The second, weather related, may cause more saline water from the Pamlico Sound into the waters of the Roanoke River. Southwesterly winds cause the more saline waters of the Pamlico Sound into the Albemarle Sound then inland up the Roanoke River. Also, Northwest wind tides (an effect similar to bathtub sloshing) in the Albemarle Sound may cause a movement of salt-water up the Roanoke River.

Lastly, are hurricanes, which are a natural weather phenomena which forces saltier Albemarle Sound water inland by the hurricane's storm surge. The hurricane's forward momentum preceding landfall produces an abnormally "higher tide" on the north side of the hurricane moving ashore/inland by the counter clockwise winds of the hurricane.

PHASE I - TASKS 6 A 1 – 6 B 3 Subject Matter Specialists:

- NC Division of Water Quality (NCDWQ)
- US Army Corps of Engineers, Wilmington District, (USACE)
- US Fish and Wildlife Service (USFWS)
- Weyerhauser Corporation

Phase I - Task 6.A.1 Evaluate the adequacy of existing river stage, storm surge, sea level rise, tidal, water quality, salt water wedge, and weather data.

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Consult with Subject Matter Specialists and decide what data will be needed to answer the questions that will lead to an adequate description and discussion of salt-water intrusion issues in the Feasibility Report.

METHOD OF ACCOMPLISHMENT: This task will be completed 70% by USACE and 30% USGS [12].

TIME: 16 person days.

ESTIMATED PROJECT COST: $11,000

SPONSORS' IN-KIND WORK: $

[12] This work will be accomplished using a Government Order issued to USGS.

Phase I - Task 6 A 2: Prepare recommendations for further data collection.

TEAM PRIORITY RATING: This task is rated as a number two priority by the members of the team.

METHODS: Consult with Subject Matter Specialists and decide what data will be needed to answer the questions that will lead to an adequate description and discussion of salt-water intrusion issues in the Feasibility Report.

METHOD OF ACCOMPLISHMENT: This task will be completed 50% by USACE and 50% USGS [13].

TIME: 10 person days.

ESTIMATED PROJECT COST: $7,000

SPONSORS' IN-KIND WORK: $0

[13] This work will be accomplished using a Government Order issued to USGS.

Phase I - Task 6.A.3: Prepare scope for development or revision of models

TEAM PRIORITY RATING: This task is rated as a number three priority by the members of the team.

METHODS: Consult with Subject Matter Specialist and develop an accurate list of tasks and associated costs. Possible in kind service, in house model (inter-agency), or contracted model.

METHOD OF ACCOMPLISHMENT: This task will be completed 70% by USACE and 30% USGS [14].

TIME: 6 person days.

ESTIMATED PROJECT COST: $4,000

SPONSORS' IN-KIND WORK: $0

[14] This work will be accomplished using a Government Order issued to USGS.

Phase I - Task 6 B. How Does the Salt Wedge Affect Water Quality, Wetlands, Aquatic Habitat and Fish Resources?

The salt wedge and its location can affect fishery resources. Most resident freshwater fish and other aquatic organisms are intolerant to salt water and may be displaced form preferred habitat by salt intrusion, spawning success may be reduced. Many freshwater marsh and wetland forest plants are also intolerant to salt may be damaged or killed by the presence of a salt wedge. It also can affect water quality - particularly in terms of dissolved oxygen concentrations at different depths in the water column. The presence of salt may be inconsistent with intended uses such as irrigation or commercial use.

PHASE I - TASK 6 B 1: Review the Existing Water Quality Data - Including Dissolved Oxygen and Salinity

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Consult Weyerhaeuser, NCDWQ, and USGS.

METHOD OF ACCOMPLISHMENT: This task was determined to be Phase II work.

TIME: 5 person days

ESTIMATED PROJECT COST: $0 [15]

SPONSORS' IN-KIND WORK: $0

[15] *This task and costs will be included in the Phase II Scope of Work.*

Phase I - Task 6 B 2: Review the Existing Fisheries Data in the Vicinity of the River Mouth and Salt Wedge, and Also Information Available in Scientific Literature.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Consult NCWRC, the Division of Marine Fisheries (NCDMF) and the National Marine Fisheries Service (NMFS).

METHOD OF ACCOMPLISHMENT: This task was determined to be Phase II work.

TIME: 15 person days

ESTIMATED PROJECT COST: $0 [16]

SPONSORS' IN-KIND WORK: $0

[16] *This task and costs will be included in the Phase II Scope of Work.*

Phase I - Task 6 B 3: Develop a Detailed Study Plan and Cost Estimate to Evaluate the Influence of the Salt Wedge on Water Quality, Wetlands, Aquatic Habitat, and Fish Resources.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Consult NCWRC, NCDMF, NMFS, Weyerhaeuser, USGS, and NCDWQ.

METHOD OF ACCOMPLISHMENT: This task was determined to be Phase II work.

TIME: 10 person days

ESTIMATED PROJECT COST: $0 [17]

SPONSORS' IN-KIND WORK: $4,000

Phase I - Task 6 Total Costs: $42,000
Sponsors' In-Kind Work: $21,000

[17] *This task and costs will be included in the Phase II Scope of Work.*

Phase I - Task 7. Diadromous Fish and Downstream Aquatic Resources

Task Funding Priority: This Task is assigned a funding priority of **HIGH**.

Phase I - Task 7 A. How Does Alteration of the Downstream Flow Regime Affect Habitat for Aquatic Organisms in the Main River Channel and Tributaries?

During re-licensing of Dominion' Inc. hydroelectric projects, a habitat based instream flow study was conducted using the Instream Flow Incremental Methodology (IFIM). This has been invaluable in developing minimum flow recommendations, and to some degree in examining the impacts of peak releases for power generation. Additional study is needed to evaluate the potential effects of peaking power releases, and to gain more insight into target base flows – particularly for diadromous species.

PHASE I - TASKS 7 A 1 – 7 A 3 Subject Matter Specialists**:**

- Dominion Inc.
- National Marine Fisheries Service (NMFS)
- NC Division of Marine Fisheries (NCDMF)
- NC Division of Water Resources NCDWR)
- NC Wildlife Resources Commission (NCWRC)
- US Army Corps of Engineers, Wilmington District, (USACE)
- US Fish and Wildlife Service – South Atlantic Fisheries (USFWS-SAF)
- Virginia Department of Game and Inland Fisheries (VADGIF)

Phase I - Task 7 A 1: Review the Existing IFIM Study and Fishery Data Obtained During Re-licensing

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Review data provided by Dominion Inc. and consult with members of the Fisheries Technical Work Group formed during re-licensing as well as other Subject Matter Specialists.

METHOD OF ACCOMPLISHMENT: This task will be completed 20% by USACE, 40% by NCDWR and 40% NCWRC.

TIME: 10 days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $6,400

NC: $6,400
VA: $0

Phase I - Task 7 A 2: Develop a Detailed Study Plan, Scope of Work and Cost Estimate to Address Questions Related to Project Operations and Downstream Aquatic Biota.

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team. This task was raked slightly lower than the other tasks by the team.

METHODS: Consider approaches including: mesohabitat mapping and modeling; sampling for fish species dependent on shallow habitat areas; observations of fish behavior and movement; and comparisons with similar rivers not subject to peaking generation. Plans should allow for independent technical review of fish data and analysis as needed to put it in the broader context of the operation of John H. Kerr Dam and Reservoir and identify opportunities to partner with ongoing related studies. Results should provide an opportunity to contrast habitat availability at different points in a peaking cycle or describe fish response to high flows. Results should also lead to identifying relative population levels of species whose preferred habitat might be limited by high flows.

METHOD OF ACCOMPLISHMENT: This task will be completed 50% by USACE 50% by NCWRC.

TIME: 30 days

ESTIMATED PROJECT COST: $24,000

SPONSORS' IN-KIND WORK: $12,000

NC: $12,000
VA: $0

7 A 3 TASK: Develop a Detailed Study Plan to Evaluate Different Target Flows for Diadromous Fish Reproduction.

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Consider approaches including: comparison of velocity profiles at selected locations over a range of flows; and monitoring of fish runs and spawning activity under different flow conditions. Results should describe effect of different flows on velocities throughout the water column, and, in turn, how this affects spawning behavior and egg viability.

METHOD OF ACCOMPLISHMENT: This task will be completed 50% by USACE, 25% by NCDWR, and 25% by NCWRC.

TIME: 24 days

ESTIMATED PROJECT COST: $19,000

SPONSORS' IN-KIND WORK: $9,500

NC: $9,500
VA: $0

Phase I - Task 7 B. ***What affect does the operation of the dam have on diadromous fish?***

During re-licensing of Dominion's Inc. hydroelectric projects, state and Federal fishery agencies developed a draft restoration plan for diadromous fisheries in the Roanoke River. This plan will provide a valuable resource in the evaluation of dam affects on migratory aquatic species. However, additional study is needed to address uncertainties regarding affected species. Some of these uncertainties include: respective use of upstream habitats, the extent they use this habitat, access to this habitat, potential for successful restoration and the economic benefits of restoration. Additional studies should also determine what actions the Corps of Engineers should take to promote diadromous fish restoration in the Roanoke River and determine the feasibility of potential restoration alternatives.

Phase I - Task 7 B 1: Review the Existing Diadromous Fish Restoration Plan and Fishery Data related to diadromous fish.

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Review data provided by Dominion Inc. and meet with members of the Fisheries Technical Work Group formed during re-licensing.

METHOD OF ACCOMPLISHMENT: This task will be completed 50% by USACE and 50% by NCWRC.

TIME: 10 person days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,000

NC: $4,000
VA: $0

Phase I - Task 7 B 2 TASK: Develop a Detailed Study Plan, Scope of Work and Cost Estimate to Address Questions Related to Habitat Restoration for Diadromous Fish.

TEAM PRIORITY RATING: This task is rated as a number one priority by the members of the team.

METHODS: Consider habitat mapping; fish sampling; observations of fish behavior and movement; and comparisons with similar unregulated rivers. Opportunities to partner with ongoing related studies should be identified. Case studies of fish restoration alternatives should be collected and reviewed. Topics shall be addressed with regard to diadromous fish populations, their status, and thorough assessment of potential fish passage designs applicable for restoration of diadromous species including American shad, river herring, American eel, and sturgeon. This Study Subject should include a preliminary economic analysis of the benefits of diadromous fish restoration including recreational and commercial harvest components focusing on the Roanoke-Albemarle system as well as other fisheries supporting diadromous species in the North Atlantic. NOAA Fisheries can assist with scoping the economic analysis and may provide some technical assistance.

METHOD OF ACCOMPLISHMENT: This task will be completed 50% by USACE and 50% by NCWRC.

TIME: 20 person days

ESTIMATED PROJECT COST: $16,000

SPONSORS' IN-KIND WORK: $8,000

NC: $8,000
VA: $0

Phase I - Task 7 Total Costs: $75,000
Sponsors' In-Kind Work: $39,900

Phase I - Task 8. Water Supply Use of Reservoir

Task Funding Priority: This Task is assigned a funding priority of **LOW**.

Phase I - Task 8 A. What are existing and potential future water supply withdrawals from the three impoundments?

Existing methods and tools for determining water supply will be identified and evaluated. Significant baseline water supply data is available for the study area. However, it is expected that additional water supply data may be required, and estimates of time and cost for this work are based on this.

The tasks under this item will link to methods and tools developed as part of previous items and/or result in the development of new tools using GIS technology. The Roanoke River Basin Reservoir Operations Model (RRBROM) (1.A.2) will be reviewed and analyzed to determine its effectiveness in supplying results needed to analyze future impacts.
Available data related to this subject will be summarized and catalogued, and recommendations for additional data collection will be prepared. Existing methods and tools for analysis and study of this subject will be prepared.

Existing data will be gathered regarding both water supply intakes located in the reservoir and downstream. Water supply discharge practices for John H. Kerr Dam under various flow conditions as well as changes in available water supply resulting from various operational constraints will be reviewed. These data will be evaluated for relevance and adequacy for the study of this subject. If gaps in the relevant data are identified, they will be evaluated for significance, and, if needed, recommendations for obtaining additional data will be developed.

PHASE I - TASKS 8 A 1 - 8 B 6: Subject Matter Specialists**:**

- City of Virginia Beach (CVB)
- Dominion Inc.
- NC Division of Water Resources (NCDWR)
- Roanoke River Basin Association (RRBA)
- Southeastern Power Administration (SEPA)
- US Army Corps of Engineers, Wilmington District (USACE)
- VA Department of Environmental Quality (VADEQ)

Phase I - Task 8 A 1: Evaluate Adequacy of Existing Water Supply Data and Prepare Recommendations for Further Data Collection as Needed.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Consult with Subject Matter Specialists and decide what data will be needed to answer the questions that will lead to an adequate description and discussion of water supply issues in the Feasibility Report. Determine cumulative data needs on basin for water supply from both surface and subsurface sources.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 10 person days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,000

Phase I - Task 8 A 2 TASK: Prepare Scope for Collection of Water Supply Data as Needed.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Communicate with water supply experts by telephone and use the input provided by the review committee to develop an accurate list of tasks and associated costs.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 3 person days

ESTIMATED PROJECT COST: $3,000

SPONSORS' IN-KIND WORK: $1,500

Phase I - Task 8 A 3: Prepare Scope for Development or Revision of Water Supply Models related to future withdrawals.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Communicate with hydrological modelers by telephone and use the input provided by the review committee to develop an accurate list of tasks and associated costs.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 10 person days.

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,000

Phase I - Task 8 A 4: Review/Analyze RRBROM for adequacy to provide desired Water Supply impacts and make recommendation for its use/revision or development of a new tool.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Employ existing data set and evaluate results.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 45 person days

ESTIMATED PROJECT COST: $36,000

SPONSORS' IN-KIND WORK: $18,000

Phase I - Task 8 B: What percentage of the water is consumptive, and how will this affect
lake levels and downstream flows?

This section of the Water Supply study item will focus on a review of all related water supply plans, projections and inter-basin transfers (IBT) of water supply as well as consumptive impacts. Existing water supply locations will be examined for capacity, expansion connects ability to other systems and water supply experts within municipal, industrial and governmental arenas will be consulted. The anticipated outcome is a real time data collection/input approach and water supply related model that can be used to evaluate impacts on reservoir operations and make decisions regarding available capacity during critical drought periods.

Phase I - Task 8 B 1: Prepare Scope for Development of a new GIS Model or Revision of RRBROM for Water Supply Related to Consumptive Impacts and IBT.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Meet with municipal, industrial, governmental, and other experts along with the input provided by the review committee to develop an accurate list of tasks and associated costs. Assure that model can be linked to reservoir operations model.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 10 person days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,000

Phase I - Task 8 B 2: Evaluate Adequacy of Existing Data and Prepare Recommendations for Further Data Collection through consultation with various experts.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Consult with Subject Matter Specialists and decide what data will be needed to answer the questions that will lead to an adequate description and discussion of consumptive and IBT issues in the Feasibility Report. Determine cumulative data needs for basin.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 10 person days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,000

Phase I - Task 8 B 3: Prepare Scope for Collection of Consumptive and IBT Data as Needed.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Communicate with related experts by telephone and use the input provided by the review committee to develop an accurate list of tasks and associated costs.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 3 person days

ESTIMATED PROJECT COST: $3,000

SPONSORS' IN-KIND WORK: $1,500

Phase I - Task 8 B 4: Prepare Scope for Development or Revision of models to evaluate future critical periods on a real time basis.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Communicate with hydrological modelers and use the input provided by the review committee to develop an accurate list of tasks and associated costs.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 10 person days

ESTIMATED PROJECT COST: $8,000

SPONSORS' IN-KIND WORK: $4,000

Phase I - Task 8 Total Costs: $82,000
Sponsors' In-Kind Work: $41,000

Phase I - Task 9. Operating Policies and Administrative Procedures.

Task Funding Priority: This Task is assigned a funding priority of **HIGH**.

Phase I - Task 9 A. How are operations of the dam influenced by operating policies and procedures?

A key part of this study will entail describing the policies and administrative procedures that influence operational decisions at John H. Kerr Dam and Reservoir. This information will be described clearly and thoroughly so that it can be easily understood and interpreted by all stakeholders. Policies and procedures will also be defined in a manner that allows them to be incorporated in all relevant models used in other task items. In this way, potential changes in policies and procedures can be evaluated for their effects on the reservoir and downstream resources.

TASKS 9.1 – 9.3: Subject Matter Specialists**:**

- City of Virginia Beach (CVB)
- Dominion Inc.
- Hydro Logics, Inc. (HLI)
- NC Division of Water Resources (NCDWR)
- Southeastern Power Administration (SEPA)
- US Army Corps of Engineers , Wilmington District (USACE)
- VA Department of Environmental Quality (VADEQ)

Task 9.A.1: For Each of the Following Policies or Sources of Policy, Provide Details on Source(s) and Purpose(s). How Formulated? How Amended? How and When Renewed? What are the Terms and Conditions? How It Influences the Operation of John H. Kerr?

- SEPA contracts
- John H. Kerr guide curve and stage release policies
- USACE informal policies and procedures for adjusting to weather forecasts and other inputs
- Interactions with Philpott Lake operations
- All storage accounts and their management
- Spawning release strategies
- Water quality betterment strategies
- USACE Drought Management Plan and Policies
- Agreements between USACE and Dominion Inc.
- USACE water allocation policies
- Any other policies, procedures, or practices that influence the management of John H. Kerr Dam and Reservoir

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Literature review, agency coordination, and documentation.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 15 person days

ESTIMATED PROJECT COST: $10,000

SPONSORS' IN-KIND WORK: $5,000

Phase I - Task 9.A.2: Describe the Way These Policies are Formulated and Implemented. How Do They Interact? How are they Weighted? What are Their Cumulative and Net Effects?

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Literature review, agency coordination, and documentation. This policy framework is, in large part, implemented in the Roanoke River Basin Reservoir Operations Model (RRBROM). USACE will work with the entities responsible for maintaining the model to complete (as necessary) and, especially, to document the implementation of all relevant polices and administrative procedures. USACE will prepare a document explaining this policy framework in layman's terms, with input from SEPA and the private utilities. The policy framework will be transparent to anyone who reads the document.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 12 person days

ESTIMATED PROJECT COST: $9,000

SPONSORS' IN-KIND WORK: $4,500

Phase I - Task 9.A.3: Evaluate the Economic Relationships between the Various Parties Involved in the Generation and Transfer of Electricity.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Literature review, agency coordination, and documentation. Document the exchange of electricity and dollars over the last five years. Outline who buys how much at what cost, and then to whom it is sold and for what price.

METHOD OF ACCOMPLISHMENT: Method of accomplishment was not identified by the team for this task.

TIME: 10 person days

ESTIMATED PROJECT COST: $7,000

SPONSORS' IN-KIND WORK: $3,500

Phase I - Task 9 Total Costs: $26,000
Sponsors' In-Kind Work: $13,000

Phase I - Task 10. Modeling Oversight.

Task Funding Priority: Not applicable.

Phase I - Task 10.1.A: Why it is necessary to have a Modeling Oversight Team for this study?

Modeling is an integral part of the following resource specific study teams: (1) Downstream Flow Regime and Effects on Riparian Ecosystems; (2) Water Quality; (3) Sedimentation & Channel Morphology; (4) Downstream Flow Based Recreation; (5) Salt Wedge; (6) Diadromous Fish and Downstream Riverine Aquatic Resources; and (7) Water Supply. Since some level of modeling effort is required for seven of the nine resource specific teams it is recommended that a modeling team be established to oversee the modeling efforts. Specific modeling efforts should continue to be completed by the resource specific task group recommending the modeling effort. The purpose of the modeling team would be to assure that: (1) required resource specific modeling programs are compatible, (2) data collected is gathered in a manner which can be used for the modeling program; and (3) that duplication of modeling efforts is avoided. The modeling team should have at least one representative from each of the resource specific study teams. It is suggested that the Modeling Team have the individuals on the following list as members. Mr. Tony Young is proposed as the Team Leader for this team.

PHASE I - TASKS 10 1.A Subject Matter Specialists**:**

- NC Division of Water Quality (NCDWQ)
- NC Division of Water Resources (NCDWR)
- The Nature Conservancy (TNC)
- Unidentified Stakeholder (To be Determined)
- US Army Corps of Engineers, Wilmington District (USACE)
- Virginia Department of Environmental Quality (VADEQ)

Phase I - Task10.A.1: Evaluate Modeling and Data Requirements and Modeling Outputs for the (Resource Teams as Requested by Individual Team Leaders, Project Manager and Lead Planner.

TEAM PRIORITY RATING: This task was not rated by the members of the team.

METHODS: Meetings of the Modeling Oversight Team are required only to review modeling requirements and output from the various resource teams. Team Leaders of teams requiring review of modeling requirements and outputs will request a review through the Team Leader of the Modeling Oversight Team. Request for reviews will be provided concurrently to the Project Manager and the Lead Planner. Team meetings will be scheduled, as needed, by the Modeling Oversight Team, Team Leader. The Modeling Oversight Team will provide results of reviews concurrently to the Team Leader of the Team requesting the review, the Project Manager and the Lead Planner.

METHOD OF ACCOMPLISHMENT: This task will be accomplished by the by the following Team: Adugna Kebede, NCDWQ; (2) Jim Mead, NCDWR; Tom Francen, NCDWR; Joe Hassel, VADWQ; Sam Pearsall, TNC, Terry Brown, USACE, Tony Young, USACE and Stakeholder Representative (vacant). The Leader of the Modeling Oversight Team is

TIME: 10 person days

ESTIMATED PROJECT COST: $0[18]

SPONSORS' IN-KIND WORK: $0

Phase I Total Costs: $495,000
Sponsors' In-Kind Work: $227,760

[18] The Modeling Oversight Team will not be funded seperately***They will be funded using funds program for the Resource Team requesting review.

Tasks and Costs for Phase II

Phase II - Task 1: Downstream Flow Regime and Effects on Riparian Ecosystem

Task Funding Priority: A funding priority has not yet been established for Phase II tasks. (Use this for now.)

Phase II - Task #.Alpha Description of subject being studied. (Repeat as necessary to cover all subjects.)

Detailed decription of subject and how the study relates to the 216 Study.

Phase II - Task #.Alpha.# - #.Alpha.#: Subject Matter Specialist ***Taken from Phase I. Change as required.)***

- Dominion Inc.
- The Nature Conservancy (TNC)
- NC Department of Environment and Natural Resources (NCDENR)
- Division of Water Resources (NCDWR)
- Division of Water Quality (NCDWQ)
- Natural Heritage Program (NCNHP)
- Roanoke River National Wildlife Refuge (RRNWR)
- US Fish and Wildlife Service (USFWS)
- US Army Corps of Engineers (USACE)
- International Paper (IP)
- US Geological Survey (USGS)

Phase II - Task #.Alpha.#: (Individual Task Description. Repeat as necessary.)

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks. (Use this for now.)

METHODS: (Discusion of methods recommended to complete the task.)

METHOD OF ACCOMPLISHMENT: (Describe how team recommnds task should be completed.)

TIME: (How much time in person days will task take.)

ESTIMATED PROJECT COST (provide estimated cost.)

SPONSORS' IN-KIND WORK: (Leave blank.)

Phase II - Task #.Alpha.#: (Repeat as necessary.)

Phase II - Task 2: Water Quality

Task Funding Priority: A funding priority has not yet been established for Phase II tasks. (Use this for now.)

Phase II - Task #.Alpha Description of subject being studied. (Repeat as necessary to cover all subjects.)

Detailed decription of subject and how the study relates to the 216 Study.

Phase II - Task #.Alpha.# - #.Alpha.#: Subject Matter Specialist ***Taken from Phase I. Change as required.)***

- Dominion Inc.
- NC Division of Water Quality (NCDWQ)
- NC Wildlife Resources Commission (NCWRC)
- Roanoke River National Wildlife Refuge (RRNWF)
- US Army Corps of Engineers Wilmington District (USACE)
- US Fish and Wildlife Service (USFWS)
- US Geological Survey (USGS)
- VA Department of Game and Inland Fisheries (VADGIF)
- VA Department of Environmental Quality (VADEQ)
- The Nature Conservancy (TNC)
- Weyerhaeuser
- Other agencies as appropriate

Phase II - Task #.Alpha.#: (Individual Task Description. Repeat as necessary.)

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks. (Use this for now.)

METHODS: (Discusion of methods recommended to complete the task.)

METHOD OF ACCOMPLISHMENT: (Describe how team recommnds task should be completed.)

TIME: (How much time in person days will task take.)

ESTIMATED PROJECT COST (provide estimated cost.)

SPONSORS' IN-KIND WORK: (Leave blank.)

Phase II - Task #.Alpha.#: (Repeat as necessary.)

Phase II - Task 3: Sedimentation and Channel Morphology

Task Funding Priority: A funding priority has not yet been established for Phase II tasks. (Use this for now.)

Phase II - Task #.Alpha Description of subject being studied. (Repeat as necessary to cover all subjects.)

Detailed decription of subject and how the study relates to the 216 Study.

Phase II - Task #.Alpha.# - #.Alpha.#: Subject Matter Specialist ***Taken from Phase I. Change as required.)***

- US Geological Survey (USGS)
  - Reston, Virginia
  - Raleigh, North Carolina
  - Baltimore, Maryland
- Roanoke River National Wildlife Refuge (RRNWR)
- US Army Corps of Engineers, Wilmington District (USACE)
- NC Division of Water Quality (NCDWQ)
- Dominion Inc.
- Riverine Geomorphologists, Sedimentation Expert (as needed)

Phase II - Task #.Alpha.#: (Individual Task Description. Repeat as necessary.)

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks. (Use this for now.)

METHODS: (Discusion of methods recommended to complete the task.)

METHOD OF ACCOMPLISHMENT: (Describe how team recommnds task should be completed.)

TIME: (How much time in person days will task take.)

ESTIMATED PROJECT COST (provide estimated cost.)

SPONSORS' IN-KIND WORK: (Leave blank.)

Phase II - Task #.Alpha.#: (Repeat as necessary.)

Phase II - Task 4: Reservoir Resources

Task Funding Priority: A funding priority has not yet been established for Phase II tasks. (Use this for now.)

Phase II - Task #.Alpha Description of subject being studied. (Repeat as necessary to cover all subjects.)

Detailed decription of subject and how the study relates to the 216 Study.

Phase II - Task #.Alpha.# - #.Alpha.#: Subject Matter Specialist ***Taken from Phase I. Change as required.)***

- NC Department of Parks and Recreation (NCDPR)
- NC Wildlife Resources Commission (NCWRC)
- Regional Partnership of Local Government
- Roanoke River Basin Association (RRBA)
- Southeastern Power Administration (SEPA)
- US Army Corps of Engineers, Wilmington District (USACE)
- VA Department of Conservation & Recreation (VADCR)
- VA Department of Game and Inland Fisheries (VADGIF)

Phase II - Task #.Alpha.#: (Individual Task Description. Repeat as necessary.)

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks. (Use this for now.)

METHODS: (Discusion of methods recommended to complete the task.)

METHOD OF ACCOMPLISHMENT: (Describe how team recommnds task should be completed.)

TIME: (How much time in person days will task take.)

ESTIMATED PROJECT COST (provide estimated cost.)

SPONSORS' IN-KIND WORK: (Leave blank.)

Phase II - Task #.Alpha.#: (Repeat as necessary.)

Phase II - Task 5: Downstream Flow Based Recreation

Task Funding Priority: A funding priority has not yet been established for Phase II tasks. (Use this for now.)

Phase I - Task 5 A. What impacts do releases from John H. Kerr Dam and Reservoir have on motorized and non-motorized boating, fishing, camping, and hunting in the areas on and along the Roanoke River in North Carolina, downstream of Roanoke Rapids? What impacts do releases have on nature-based recreation (including aesthetics, wildlife educational opportunities, nature photography and bird watching) in the river study area? Existing data will be reviewed, and new data collected, so that economic benefits of downstream river-related recreation can be evaluated. One product of the study will be a model to evaluate recreation use under different flow regimes.

PHASE II - TASKS 5 A 1 - 5 A 5 Subject Matter Specialists:

- NC Division of Water Resources (NCDWR)
- NC Wildlife Resources Commission (NCWRC)
- The Nature Conservancy (TNC)
- US Army Corps of Engineers, Wilmington District (USACE)
- VA Department of Conservation & Recreation (VADCR)
- Roanoke River Partners (RRP)
- Roanoke River National Wildlife Refuge (RRNWR)

Phase II - Task 5.A.1: Review Studies Related to Recreation in the Lower Roanoke River. Bibliography Assembled by Kent Nelson, NCWRC, February 16, 2004.

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks.

METHODS: Review, analyze and summarize the following reports:

Finke, J. R. and S. Van Horn. 1993. 1990 North Carolina Angler Opinion Survey. Federal Aid in Fish Restoration Project F-23-17. N.C. Wildlife Resources Commission, Division of Boating and Inland Fisheries, Raleigh. 55pp.

Reports the results of a 1990 mail survey sent to 5,832 randomly selected license holders to assess their opinions on angling and fishery management programs in North Carolina. A total of 3,251 anglers responded to the survey. Licensed anglers in the coastal region most often (54%) fished in warmwater streams and rivers; reflecting their use of the most accessible resource available. Forty-five percent of anglers fishing warmwater streams and rivers made over 20 trips per year. Freshwater anglers in the coastal region most often fished by boat (76%) or from the bank (23%). Anglers fishing warmwater streams and rivers preferred fishing by boat (70%) or from the bank (28%)

U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, U.S. Census Bureau. 2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation.

An interview-based survey which estimates participation and expenditures in hunting, fishing and other wildlife-related recreation in the U.S. by state.

Schuhmann, P. W. 1999. Economic valuation of Roanoke River striped bass recreational fishery. Federal Aid in Fish Restoration Project F-22. North Carolina Wildlife Resources Commission, Division of Inland Fisheries, Raleigh. 26pp.

The economic value of the 1996 spring striped bass fishery on the Roanoke River was estimated based on willingness to pay for marginal changes in expected catch rates. Data were derived from angler-completed questionnaires and a random utility model was used to value hypothetical changes in trip quality. The value of the 3-month striped bass fishery was estimated from $796,500 to $814,000. Reported expenditures were greater for catch-and-release anglers ($115 per day) in comparison to harvest-oriented

anglers ($22 per day). Study covered the length of the Roanoke River downstream from Roanoke Rapids dam.

Kornegay, J. W. 2000. Roanoke River sport fishery creel survey, 1997-1999. Federal Aid in Fish Restoration Project F-22. North Carolina Wildlife Resources Commission, Division of Inland Fisheries, Raleigh. 19 pp.

A non-uniform probability stratified access point creel survey was used to estimate sport fishing effort, total catch and harvest of striped bass and other species from the Roanoke River Striped Bass Management Area during each spring (typically mid-March to the end of May), 1997-1999. Other objectives were to estimate numbers of striped bass caught and released during the harvest seasons and to estimate numbers of striped bass caught and released after season closure. Total angling effort for striped bass and other species, principally largemouth bass and hickory shad, ranged from 118,990 angler-hours in 1997 to 136,646 angler hours in 1998. During the open striped bass seasons of 1997-1999, North Carolina residents of counties not bordering the Roanoke River accounted for 49-54% of all anglers. Out-of-state anglers accounted for only 2% of all anglers during the open harvest seasons, but their proportions increased to 4-10% during post-harvest periods. The increasing participation of non-local anglers on the Roanoke River likely reflects widespread publicity about the striped bass fishery.

Kornegay, J. W. and K. L. Nelson. 1997. Roanoke River sport fishery creel survey, 1994-1996. Federal Aid in Fish Restoration Project F-22. North Carolina Wildlife Resources Commission, Division of Inland Fisheries, Raleigh. 20 pp.

A non-uniform probability stratified access point creel survey was used to estimate sport fishing effort, total catch and harvest of striped bass and other species from the Roanoke River Striped Bass Management Area during each spring, 1994-1996. Other objectives were to estimate numbers of striped bass caught and released after season closure in 1995 and 1996 and to collect economic data for the Schuhmann (1999) study in 1996. Total estimated angling effort for striped bass and other species during the creel survey periods ranged from 52,289 angler-hours in 1994 to 144,954 angler-hours in 1996. During the 79-day study period in 1996, Roanoke River anglers spent $212,298 fishing for striped bass, $50,332 fishing for largemouth bass, and $139,340 for other species. During the 3-year study, from 60-68% of the interviewed anglers resided in counties that bordered Roanoke River. The

proportion of anglers who were non-North Carolina residents ranged from 0.8-1.4%.

METHOD OF ACCOMPLISHMENT: A method of accomplishment has not yet been assigned to this task..

TIME:

ESTIMATED PROJECT COST: $5,000

SPONSORS" IN-KIND WORK:

Phase II - Task 5.A.2: Geographic-based Evaluation of Flooding Impacts on Recreation Access and Immersion of Recreation Lands.

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks.

METHODS: Identify access roads, boat ramps, and recreation lands for inclusion in the GIS database being developed by the Downstream Riparian Ecosystem Task Group

- Start with existing GIS "layers" for roads and digital elevation map
- Interview NC Wildlife Resources Commission enforcement officers, National Wildlife Refuge staff, commercial guides, and hunting club managers to identify important access and lands.
- As needed, recommend addition of roads to the existing GIS layer. This would be part of the effort overseen by the Downstream Riparian Ecosystem Task Group, and would entail GPS measurements and notations regarding road grade elevation with respect to topography.

Evaluate the effects of John H. Kerr Reservoir operation on access roads, boat ramps, and recreation lands.

- Quantify the acreage submerged.
- Quantify the acreage cut off from access.
- Identify ramps and sections of the river that become difficult or impossible to use.
- Repeat evaluation for existing operating procedures and potential alternatives.

Supplement the quantification of part 2 above through a Delphi exercise conducted with local experts.

- Convene a group of the same individuals consulted in part 1b above.

- Use computer projection equipment, the flood model developed by the Downstream Riparian Ecosystem Task Group, and the GIS database of roads, boat ramps and recreation lands described in part 1.

- Display the extent of flooding caused by various reservoir operation alternatives and obtain input on desirable and undesirable effects.

METHOD OF ACCOMPLISHMENT: This task should be undertaken by a private consultant.

TIME:

ESTIMATED PROJECT COST: $10,000

SPONSORS" IN-KIND WORK:

Phase II Task 5.A.3: Downstream Recreation Carrying Capacity

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks.

METHODS: The study area is defined to be the Roanoke River from Roanoke Rapids, NC to its terminus in Albemarle Sound, NC. Indicator activities shall include the following: hunting, fishing, nature observation, and canoe trail use. Potential sources of data include hunting permits, boat trailer counts, and boat ramp parking capacity – all available from NCWRC. In addition, interviews with local experts and others (outfitters, camping platform users, etc.) may be needed to evaluate how many people elect not to engage in an activity under certain flow and flooding conditions – regardless of the level of physical constraint on the activity.

- Determine the existing recreational carrying capacity of the river - in user days - by activity type.
- Determine how changes in flow and flooding affect the recreational carrying capacity of the river, measured in user days.
- Determine the existing recreational carrying capacity of lands within the floodplain of the Roanoke River - in user days - by activity type.
- Determine how changes in flow and flooding affect the recreational carrying capacity, by activity type, of the lands within the floodplain as well as those lands that become inaccessible during high water events along the Roanoke River in the study area.

METHOD OF ACCOMPLISHMENT: This task should be undertaken by a private consultant.

TIME:

ESTIMATED PROJECT COST: $35,000

SPONSORS" IN-KIND WORK:

Phase II - Task 5.A.4: Determination of How Recreation User Days are Influenced by John H. Kerr Reservoir Operations

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks.

METHODS: The scope is limited to the stream flows downstream of Dominion's Roanoke Rapids power station (see map ____). The impact of flows from John H. Kerr Reservoir through the Gaston and Roanoke Rapids power stations will be measured.

- Taking data and/or information resulting from the tasks 6.A.2 and 6.A.3 above, develop a data processing tool to quantify and summarize the impacts of the flow releases related to John H. Kerr Lake operations on various types of downstream flow-based recreation activities. Seasonal variation in impacts will also be considered. Indicator activities shall include the following: hunting, fishing, nature observation, and canoe trail use.
- A methodology will be included for measuring the benefits or costs, in user days, of different flow regimes from John H. Kerr Reservoir. Demand for recreation activities will be limited to the carrying capacity by:
    - access for boating (includes parking and ramps),
    - hunting permits issued according to each sites' acres, or
    - maximum capacity of canoe trails or the outfitters that serve them.
- This processing tool will be able to be linked to the flow and flood models developed in Task 1, so that the Integration Team can efficiently evaluate the effect of different flow scenarios on downstream recreation user days.
- For each recreation activity, the complete range of available flows will be considered, with a notation of the minimum, maximum, and optimum flow to calculate the beneficial recreation output. If access by trail or road is essential for the recreation activity, the flooding of trails or roads can be a constraint.
- If necessary, develop an instrument to forecast future demand or "willingness to pay" for the indicator activities. The instrument will be developed consistent with the Office of Management and Budget (OMB) guidelines and submitted to OMB for approval.

METHOD OF ACCOMPLISHMENT: This task should be undertaken by a private consultant.

TIME:

ESTIMATED PROJECT COST: $10,000

Phase II - Task 5 Total Costs: $
Sponsors' In-Kind Work: $

Phase II - Task 6: Salt Wedge

Task Funding Priority: A funding priority has not yet been established for Phase II tasks. (Use this for now.)

Phase II - Task #.Alpha Description of subject being studied. (Repeat as necessary to cover all subjects.)

Detailed decription of subject and how the study relates to the 216 Study.

Phase II - Task #.Alpha.# - #.Alpha.#: Subject Matter Specialist ***Taken from Phase I. Change as required.)***

- NC Division of Water Quality (NCDWQ)
- US Army Corps of Engineers, Wilmington District, (USACE)
- US Fish and Wildlife Service (USFWS)
- Weyerhauser Corporation

Phase II - Task #.Alpha.#: (Individual Task Description. Repeat as necessary.)

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks. (Use this for now.)

METHODS: (Discusion of methods recommended to complete the task.)

METHOD OF ACCOMPLISHMENT: (Describe how team recommnds task should be completed.)

TIME: (How much time in person days will task take.)

ESTIMATED PROJECT COST (provide estimated cost.)

SPONSORS' IN-KIND WORK: (Leave blank.)

Phase II - Task #.Alpha.#: (Repeat as necessary.)

Phase II - Task 7 Diadromous Fish and Downstream Riverine Aquatic Resources

Task Funding Priority: A funding priority has not yet been established for Phase II tasks. (Use this for now.)

Phase II - Task #.Alpha Description of subject being studied. (Repeat as necessary to cover all subjects.)

Detailed decription of subject and how the study relates to the 216 Study.

Phase II - Task #.Alpha.# - #.Alpha.#: Subject Matter Specialist ***Taken from Phase I. Change as required.)***

- Dominion Inc.
- National Marine Fisheries Service (NMFS)
- NC Division of Marine Fisheries (NCDMF)
- NC Division of Water Resources NCDWR)
- NC Wildlife Resources Commission (NCWRC)
- US Army Corps of Engineers, Wilmington District, (USACE)
- US Fish and Wildlife Service – South Atlantic Fisheries (USFWS-SAF)
- Virginia Department of Game and Inland Fisheries (VADGIF)

Phase II - Task #.Alpha.#: (Individual Task Description. Repeat as necessary.)

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks. (Use this for now.)

METHODS: (Discusion of methods recommended to complete the task.)

METHOD OF ACCOMPLISHMENT: (Describe how team recommnds task should be completed.)

TIME: (How much time in person days will task take.)

ESTIMATED PROJECT COST (provide estimated cost.)

SPONSORS' IN-KIND WORK: (Leave blank.)

Phase II - Task #.Alpha.#: (Repeat as necessary.)

Phase II - Task 8: Water Supply

Task Funding Priority: A funding priority has not yet been established for Phase II tasks. (Use this for now.)

Phase II - Task #.Alpha Description of subject being studied. (Repeat as necessary to cover all subjects.)

Detailed decription of subject and how the study relates to the 216 Study.

Phase II - Task #.Alpha.# - #.Alpha.#: Subject Matter Specialist ***Taken from Phase I. Change as required.)***

- City of Virginia Beach (CVB)
- Dominion Inc.
- NC Division of Water Resources (NCDWR)
- Roanoke River Basin Association (RRBA)
- Southeastern Power Administration (SEPA)
- US Army Corps of Engineers, Wilmington District (USACE)
- VA Department of Environmental Quality (VADEQ)

Phase II - Task #.Alpha.#: (Individual Task Description. Repeat as necessary.)

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks. (Use this for now.)

METHODS: (Discusion of methods recommended to complete the task.)

METHOD OF ACCOMPLISHMENT: (Describe how team recommnds task should be completed.)

TIME: (How much time in person days will task take.)

ESTIMATED PROJECT COST (provide estimated cost.)

SPONSORS' IN-KIND WORK: (Leave blank.)

Phase II - Task #.Alpha.#: (Repeat as necessary.)

Phase II - Task 9. Operating Policies and Administrative Procedure

Task Funding Priority: A funding priority has not yet been established for Phase II tasks. (Use this for now.)

Phase II - Task 9.A How are the operations of the dam influenced by operating policies and procedures?

The Flood Control Act of 1944 authorized John H. Kerr Dam and Reservoir for the multiple purposes of flood control, navigation, water supply, water quality enhancement, recreation, and hydroelectric generation. Power from the project is marketed by the Southeastern Power Administration as provided by federal law. In the subsequent sixty years, this statutory authorization has been implemented through operating policies and administrative procedures of the U.S. Army Corps of Engineers (USACE), Wilmington District. Today, the dam is operated under a water control plan, guide curve, contracts for hydroelectric generation and water supply, and other non-statutory requirements. It is operated in hydrologic coordination with the USACE, Wilmington District's Philpott Dam, located upstream, and Dominion Inc.'s Roanoke Rapids and Gaston Projects (Federal Energy Regulatory Commission (FERC) Number 2009), located just downstream.

As stated in the John H. Kerr Reservoir Section 216 Study Reconnaissance Report (March 2001), the Feasibility Study now being prepared will result in a recommendation whether the structure, operation, or storage allocation of the reservoir should be modified for the purpose of improving the overall public benefits of the project in the study area, which includes John H. Kerr Reservoir and the Roanoke River downstream to Albemarle Sound. This task will: (1) identify and describe each policy that guides project operation, storage allocations, and downstream releases including its legal authority and terms; (2) describe how the many policies are integrated in actual operational decisions, including the respective responsibilities of the USACE, Wilmington District and third parties for implementation; (3) describe the policies that allocate the revenues associated with such hydroelectric generation; (4) evaluate the scope of discretion available to the USACE, Wilmington District to change current operation or storage allocation for the stated purpose of the Feasibility Study; (5) describe the statutes, rules, and policies that direct the marketing of power from the project by the Southeastern Power Administration (SEPA) and how they interact with the authorities under which the USACE, Wilmington District operates the project; and (6) determine how much latitude is available for operational changes under each policy affecting, the project and w^{h}at procedure is necessary to change each policy.

This task will require compilation and review of relevant documents and interviews of appropriate employees and consultants of USACE, Wilmington District and third parties. The report will describe these policies in pragmatic terms. It may be organized by policy, project purpose, or in any other functional manner that the consultant and the John H. Kerr Section 216 Feasibility Operating Policies and Administrative Procedures Study Team determines will best assist the USACE, Wilmington District, study's sponsors, and other stakeholders to understand how alternative plans would change current policies for operation or storage allocation. In sum, the report will put the reader into the shoes of the actual operators, so that the procedures they follow, and the actual factors they consider for their operational decisions will be transparent.

Phase II - Task 9.A.1 - 9.A.4: Subject Matter Specialist

- City of Virginia Beach (CVB)
- Dominion Inc.
- Hydro Logics, Inc. (HLI)
- NC Division of Water Resources (NCDWR)
- Southeastern Power Administration (SEPA)
- US Army Corps of Engineers , Wilmington District (USACE)
- VA Department of Environmental Quality (VADEQ)

Phase II - Task 9.A.1: Identify each policy that guides the current operation of the reservoir and the storage allocation. Describe the origin (including any express legal authority history or administration, and specific terms, including any provision for amendment, termination, or expiration, of each policy.

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks.

METHODS: Policy will be broadly defined to include any form of written document or unwritten practice or procedure that guides reservoir operation. Such policies include: (1) the 1944 authorization and the Chief of Engineers' report incorporated therein; (2) an other relevant acts of Congress, (3) the USACE's Engineering Regulations and Pamphlets; (4) the John H. Kerr Reservoir Water Control Plan; (5) any policy for coordination of John H. Kerr and Philpott; (6) any contract or other form of agreement with Dominion Inc. for operation of the John H. Kerr Powerhouse or for the benefit of the Roanoke Rapids and Gaston Project; (7) any contract or other form of agreement with the SEPA; (8) any contract or other form of agreement for storage or release of water for the purpose of water supply; (9) any form of agreement with North Carolina Department of Environment and Natural Resources (NCDENR), North Carolina Division of Water Quality (NCDWQ) or North Carolina Wildlife Resources Commission (NCWRC) for storage or release for downstream environmental quality; (10) any policy agreements or informal coordination with the Smith Mountain and Leesville projects; (11) the FERC License for the Dominion Inc.'s projects on the Roanoke River and the related settlement agreement; and (12) any other policies relevant to the operation of the John H. Kerr project.

METHOD OF ACCOMPLISHMENT: This task should be undertaken by a private consultant.

TIME:

ESTIMATED PROJECT COST

SPONSORS' IN-KIND WORK:

Phase II - Task 9.A.2: Describe how the identified policies are integrated in the actual decisions for storage, allocation of storage, and release of water. Describe the extent to which the John H. Kerr Reservoir Water Control Plan, on its face (especially the guide curve and the release schedule), is consistent with such policies, and the extent to which they are written or otherwise extraneous to that plan.

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks.

METHODS: Describe the relative priorities for water management by season or otherwise, for example under high and low inflow conditions, and the procedure for resolving any potential or actual conflict between project purposes. Describe whether and how the USACE, Wilmington District delegates or shares any responsibility for operation to Dominion Inc., SEPA, or any other third parties with which it has contractual or other relationships for such management. The final topic will include any storage accounts. For example, describe how the USACE, Wilmington District establishes the Weekly or Daily Declaration, and how Dominion Inc. implements such declaration these declarations are modified and implemented.

METHOD OF ACCOMPLISHMENT: This task should be undertaken by a private consultant.

TIME:

ESTIMATED PROJECT COST

SPONSORS' IN-KIND WORK:

Phase II - Task 9.A.3: Describe the economic relationships between the USACE, Wilmington District, and Dominion Inc., SEPA, and any other third parties involved in power generation.

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks.

METHODS: Document the payments among the parties since 1952. Identify retail customers of such generation services, by location and amount, over the same period. Define the relationship among the flows, hydraulic head, power generation, and power values at John H. Kerr so that alternative flow schedules can be financially evaluated. These relationships should be documented in suitable detail and format to be used in subsequent modeling The analysis should include both wholesale and retail power rates and should include the effects of planned power generation upgrades at John H. Kerr.

METHOD OF ACCOMPLISHMENT: This task should be undertaken by a private consultant.

TIME:

ESTIMATED PROJECT COST

SPONSORS' IN-KIND WORK:

Phase II - Task 9.A.4: For each type of change in operation or storage allocation as identified in paragraph 5(c) of the "Supplemental Sheet, Reconnaissance Report" (May 29, 2001), describe what change in current policies would be necessary for implementation of such change, and whether policies expressly permit or prohibit such change.

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks.

METHODS: Analyze whether the 1944 authorization, subsequent acts of Congress affecting the project as well as the general laws that apply to all of the USACE's civil works projects including it permit or prohibit such change in operation or storage allocation.

METHOD OF ACCOMPLISHMENT: This task should be undertaken by a private consultant.

TIME:

ESTIMATED PROJECT COST

SPONSORS' IN-KIND WORK:

Phase II - Task 9 Total Costs: $
Sponsors' In-Kind Work: $

Phase II - Task 10: Modeling Oversight

Task Funding Priority: A funding priority has not yet been established for Phase II tasks. (Use this for now.)

Phase II - Task #.Alpha Description of subject being studied. (Repeat as necessary to cover all subjects.)

Detailed decription of subject and how the study relates to the 216 Study.

Phase II - Task #.Alpha.# - #.Alpha.#: Subject Matter Specialist ***Taken from Phase I. Change as required.)***

- NC Division of Water Quality (NCDWQ)
- NC Division of Water Resources (NCDWR)
- The Nature Conservancy (TNC)
- Unidentified Stakeholder (To be Determined)
- US Army Corps of Engineers, Wilmington District (USACE)
- Virginia Department of Environmental Quality (VADEQ)

Phase II - Task #.Alpha.#: (Individual Task Description. Repeat as necessary.)

TEAM PRIORITY RATING: Team priority ratings have not yet been identified for Phase II tasks. (Use this for now.)

METHODS: (Discusion of methods recommended to complete the task.)

METHOD OF ACCOMPLISHMENT: (Describe how team recommnds task should be completed.)

TIME: (How much time in person days will task take.

ESTIMATED PROJECT COST (provide estimated cost.)

SPONSORS' IN-KIND WORK: (Leave blank.)

Phase II - Task #.Alpha.#: (Repeat as necessary.)

TASKS AND COSTS FOR PHASE 3

Tasks and associated costs for Phase 3 will be determined during Phase 2 of the study.

The estimated cost for Phase 3 of the study is: $800,000.

During Phase 3 it will be necessary to integrate study elements and consider overall alternatives. The PDT in consult with appropriate subject matter specialists will develop a process to formulate alternatives. The suggested
approach is to make use of all of the interrelationships and feedback loops between the various components of the Roanoke system. A diagram illustrating the linkages between the different study elements is shown on the following page.

TOTAL STUDY COSTS

The total study costs at this time are estimated to be 3,000,000 dollars. Cost amounts may change throughout the various phases of this study.

REFERENCES CITED

REFERENCES CITED

Federal Energy Regulatory Commission

1995 Relicensing First Stage Consultation Package for Major Project - Roanoke Rapids Lake and Lake Gaston Hydropower Project. FERC Project No. 2009. North, Carolina Power.

1996 Relicensing Study Plans for Major Project - Roanoke Rapids Lake and Lake Gaston Hydropower Project. FERC Project No. 2009. North Carolina Power.

1997 Roanoke Rapids Lake and Lake Gaston Hydropower Project. Water Quality Year-End Report. North Carolina Power.

1997 Roanoke Rapids Lake and Lake Gaston Hydropower Project. Terrestrial Resources Year-End Report. North Carolina Power.

1997 Roanoke Rapids Lake and Lake Gaston Hydropower Project Recreational Resources Year-End Report. North Carolina Power.

1997 Roanoke Rapids Lake and Lake Gaston Hydropower Project Recreational Resources Year-End Report. North Carolina Power.

1997 Aquatic Resources of Lake Gaston and Roanoke Rapids Lake Updated Version of 1996 Year-End Report. Prepared for North Carolina Power.

1999 Draft Application for Licensing for Major Project-Existing Dam Roanoke Rapids Lake and Lake Gaston Hydropower Project. FERC Project No. 2009. North Carolina Power.

1999 Draft Applicant Prepared Environmental Assessment for Licensing for Major Project-Existing Dam Roanoke Rapids Lake and Lake Gaston Hydropower Project. FERC Project No. 2009.

1999 Appendices to the Draft Applicant Prepared Environmental Assessment for Licensing for Major Project-Existing Dam Roanoke Rapids Lake and Lake Gaston Hydropower Project. FERC Project No. 2009.

Finke, J. R. and S. Van Horn

1993. 1990 North Carolina Angler Opinion Survey. Federal Aid in Fish Restoration Project F-23-17. N.C. Wildlife Resources Commission, Division of Boating and Inland Fisheries, Raleigh, North Carolina.

HydroLogics, Inc.

n.d. Roanoke River Basin Reservoir Operations Model (RRBROM), Columbia, Maryland.

Kornegay, J. W.

2000. Roanoke River sport fishery creel survey, 1997-1999. Federal Aid in Fish Restoration Project F-22. North Carolina Wildlife Resources Commission, Division of Inland Fisheries, Raleigh, North Carolina.

Kornegay, J. W. and K. L. Nelson.

1997 Roanoke River sport fishery creel survey, 1994-1996. Federal Aid in Fish Restoration Project F-22. North Carolina Wildlife Resources Commission, Division of Inland Fisheries, Raleigh, North Carolina.

Schuhmann, P. W.

1999 Economic valuation of Roanoke River striped bass recreational fishery. Federal Aid in Fish Restoration Project F-22. North Carolina Wildlife Resources Commission, Division of Inland Fisheries, Raleigh, North Carolina.

U.S. Council on Environmental Quality

1978 *Regulations for Implementing National Environmental Policy Act*. 40 Code of Federal Regulations Parts 1500-1508, 43 Federal Register 55990, November 28, 1978.

U.S Army Corps of Engineers

2000 *Planning Guidance Note Book*. Engineering Regulation 1105-2-100, April 22, 2000, U.S. Army Corps of Engineers, Washington D.C.

U.S. Army Corps of Engineers, Wilmington District

1980 John H. Kerr dam and Reservoir, Master Plan Update (Design Memorandum Number 5), Wilmington, North Carolina.

1985 Reconnaissance Report on John H. Kerr Dam and Reservoir, Virginia and North Carolina (Section 216, Public Law 91-611). Wilmington District, Wilmington, North Carolina.

1992 Operational Management Plan, John H. Kerr Reservoir, Wilmington, North Carolina.

1995 Water Control Plan for John H. Kerr Dam and Reservoir, Wilmington, North Carolina.

1995 Shoreline Management Plan for John H. Kerr Reservoir, North Carolina and Virginia. Appendic VI of the Operational Management Plan. Wilmington, North Carolina.

1996 Initial Appriasl Report For the Lower Roanoke River Basin Study Below the John H. Kerr Dam and Reservoir, Virginia and North Carolina (216), Wilmington, North Carlina.

2001 Reconnaissance Report (905(b) Report) John H. Kerr Dam and Reservoir, Virginia and North Carolina (Section 216) Lower Roanoke River. Wilmington, North Carolina.

U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce

2001 U.S. Census Bureau. 2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation.

U.S. Water Resources Council

1983 *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*. 8 July 1983, United States Water Resources Council, Washington DC.

ATTACHMENT 1
JOHN H. KERR DAM AND RESERVOIR SECTION 216 STUDY SCHEDULE

John H. Kerr Dam and Reservoir Section 216 Study Schedule

905(b) Report approved	May 2001
Sponsors' Advisory Committee formed	November 2001
PMP completed	January 2002
FCSA executed	June 2003
Technical work groups formed/Team leaders assigned	May 2004\
Work groups complete phase 1 scope of work (SOW)	March 2004
Begin phase 1 feasibility	April 2004
Work groups complete SOW for phase 2	October 2004
Work groups begin phase 2	December 2004
Work groups complete scope of work for phase 3	December 2005
Work groups begin phase 3	January 2006
Work groups complete phase 3	March 2007
Feasibility report and NEPA documents complete	June 2007
Feasibility report approved by Division	July 2007

ATTACHMENT 2
EXECUTIVE COMMITTEE
AND PROJECT DELIVERY TEAM MEMBERS

JOHN H. KERR 216 STUDY

EXECUTIVE COMMITTEE MEMBERS:

NAME	ORGANIZATION	E-MAIL ADDRESS	PHONE
Col. Ray Alexander	District Engineer, U.S. Army Corps of Engineers, Wilmington (USACE, Wilmington)	Charles.R.Alexander@saw02.usace.army.mil	910-251-4501
John Morris	Director, NC Division of Water Resources	john.morris@ncmail.net	919-715-5422
David Paylor	VA, Dep. Secretary of Natural Resources	dpaylor@gov.state.va.us	804-698-4240

SPONSORS' ADVISORY COMMITTEE MEMBERS:

NAME	ORGANIZATION	E-MAIL ADDRESS	PHONE
Leon App	VA Dept. of Conservation & Recreation	leonapp@dcr.state.va.us	804-786-2093
Bill Bolin	Dominion Resources	Bill_Bolin@dom.com	804-271-5304
Prescott Brownell	National Marine Fisheries Service	Prescott.Brownell@noaa.gov	843-762-8591
Boyd DeVane	NC Division of Water Quality	boyd.devane@ncmail.net	919-733-5083
Carter Edge	Southeastern Power Administration	cartere@sepa.doe.gov	06-213-3855
John Ellis	U.S. Fish & Wildlife Service	john_ellis@fws.gov	919-856-4520 ext. 26
Joe Hassell	VA Dept. of Environmental Quality	jphassell@deq.state.va.us	804-698-4072
Bud LaRoche	VA Dept of Game & Inland Fisheries	blaroche@dgif.state.va.us	434-525-7522
Thomas Leahy	City of Virginia Beach	tleahy@vbgov.com	757-427-8654
Martin Lebo	Weyerhaeuser Company	martin.lebo@weyerhaeuser.com	252-633-7511
Bob Lindsay	Roanoke River Basin Association	blindsay@rrba.org	919-818-7634
Jim Mead	NC Division of Water Resources	jim.mead@ncmail.net	919-715-5428
Kent Nelson	NC Wildlife Resources Commission	nelsonk3@earthlink.net	252-752-5425
Sam Pearsall	The Nature Conservancy	spearsall@tnc.org	919-403-8558
Russell Slayton	Regional Partnership of Local Gov'ts	sbclaw@telpage.net	434-848-3632
Brian Strong	NC State Parks/Resource Management	brian.strong@ncmail.net	919-715-8711
Sara Winslow	NC Division of Marine Fisheries	sara.winslow@ncmail.net	252-264-3911

JOHN H. KERR 216 STUDY

CORPS OF ENGINEERS STAFF MEMBERS

NAME	ORGANIZATION	E-MAIL ADDRESS	PHONE
Bill Adams	Env. Res.Sec, Chief USACE, Wilmington	William.F.Adams@saw02.usace.army.mil	910-251-4748
Terry Brown	Hydraulics Operations Manager, USACE, Wilmington	terry.m.brown@usace.army.mil	910-251-4761
Rosemary Cohen	USACE, Wilmington	rosemary.e.cohen@saw02.usace.army.mil	910-251-4928
Dianne Edwardson	J.H Kerr Reservoir, Operations Manager USACE, Wilmington	dianne.b.edwardson@saw02.usace.army.mil	434-738-6144 ext. 101
Daniel Emerson	USACE, Wilmington	Daniel.c.emerson@saw02.usace.army.mil	910-251-4490
John Hazelton	USACE, Wilmington	john.m.hazelton@saw02.usace.army.mil	910-251-4758
Lisa Hetherman	Project Manager, USACE, Wilmington	lisa.l.hetherman@saw02.usace.army.mil	910-251-4831
Richard Lewis	USACE, Wilmington	Richard.h.lewis@saw02.usace.army.mil	910-251-4755
Coleman Long	Planning Branch, Chief, USACE,Wilmington	coleman.long@usace.army.mil	910-251-4505
Allen Piner	USACE, Wilmington	george.a.piner@saw02.usace.army.mil	910-251-4762
Hasan Pourtaheri	USACE, Wilmington	hasan.pourtaheri@saw02.usace.army.mil	910-251-4547
Jeff Richter	USACE, Wilmington	Jeffrey.h.richter@saw02.usace.army.mil	910-251-4636
Frank Snipes	USACE, Wilmington	frank.e.snipes@usace.army.mil	910-251-4774
Caroline Struthers	USACE, Wilmington	Caroline.J.Struthers@saw02.usace.army.mil	910-251-4977
Greg Williams	Coastal H&H Section, Chief USACE, Wilmington	greg.l.williams@saw02.usace.army.mil	910-251-4767
Chuck Wilson	USACE, Wilmington	charles.r.wilson@saw02.usace.army.mil	910-251-4746
Ben Wood	DDPM [19], USACE, Wilmington USACE,Wilmington	ben.wood@saw02.usace.army.mil	910-251-4478
Frank Yelverton	USACE, Wilmington	frank.yelverton@saw02.usace.army.mil	910-251-4640
Tony Young	USACE, Wilmington	michael.a.young@saw02.usace.army.mil	910-251-4455

[19] Deputy District Engineer for Programs and Project Management

JOHN H. KERR 216 STUDY

INTERESTED PERSONS

NAME	ORGANIZATION	E-MAIL ADDRESS	PHONE
Gene Addesso	Roanoke River Basin Association	gene@gaddesso.net	919-870-0833
Tom Augspurger	US Fish & Wildlife Service	tom_augspurger@fws.gov	919-856-4520 ext. 21
Jerad Bales	US Geological Survey	jdbales@usgs.gov	919-571-4048
Marc Bernstein	NC Attorney General's Office	mbern@mail.jus.state.nc.us	919-716-6956
Mike Canada	FWS/Roanoke River Natl Wildlife Refuge	mike_Canada@fws.gov	252-794-3808
Wayne Carter	Mecklenburg County	hwcarter@meckcom.net	804-476-3310
David Coburn	NC State Parks/Kerr Lake SRA	david.coburn@ncmail.net	252-438-7791
John Davy	VA Dept. of Conservation & Recreation	jdavy@dcr.state.va.us	804-786-1119
John Dorney	NC Division of Water Quality	john.dorney@ncmail.net	919-733-9646
Wayne Dyok	Montgomery Watson & Harza Engineering	wayne.m.dyok@mwhglobal.com	916-921-1910 ext. 19
Jennifer Everett	NC Division of Water Quality	Jennifer.Everett@ncmail.net	919-733-5083 ext 374
Tom Fransen	NC Division of Water Resources	tom.fransen@ncmail.net	919-715-0381
Earl Gillis	NC Wildlife Resources Commission	gilliseb@coastalnet.com	252-745-4533
Bob Goss	Southeastern Power Administration	bobg@sepa.doe.gov	706-213-3860
Bob Graham	Dominion Resources	bob_graham@dom.com	804-271-5375
Steve Hall	NC Natural Heritage Program	Stephen.hall@ncmail.net	919-715-8688
Will Hardison	Weyerhaeuser Company	will.hardison@weyerhaeuser.com	252-793-8269
Jack Hearne	Steele Creek Marina	marinajack@mindspring.com	252-213-1913
Joe Hightower	US Geological Survey	jhightower@ncsu.edu	919-515-8836
Harvey Hill	FWS/Roanoke River Natl Wildlife Refuge	harvey_hill@fws.gov	252-794-3808
Jeff Horton	The Nature Conservancy	jhorton@tnc.org	252-794-1818
Cliff Hupp	US Geological Survey	crhupp@usgs.gov	703-648-5207
Wayne Jones	NC Wildlife Resources Commission	jonestw1@earthlink.net	252-443-3536
Adugna Kebede	NC Division of Water Quality	adugna.kebede@ncmail.net	919-733-5083 ext 515
Pete Kornegay	NC Wildlife Resources Commission	kornegayjw@mchsi.com	252-338-3607
Wilson Laney	US Fish & Wildlife Service	Wilson_laney@fws.gov	919-515-5019
Gerry Lovelace	Halifax Co., VA	gvl@co.halifax.va.us	434-476-3310

JOHN H. KERR 216 STUDY

INTERESTED PERSONS (con't)

NAME	ORGANIZATION	E-MAIL ADDRESS	PHONE
Brian McCrodden	Hydro Logics, Inc.	bmccrodden@hydrologics.net	919-856-1288
Masato Miwa	International Paper Company	Masato.Miwa@ipaper.com	229-246-3642
Jim Mulligan	NC Division of Water Quality	Jim.Mulligan@ncmail.net	252-946-6481
Robert Munson	VA Dept of Conservation & Recreation	rsmunson@dcr.state.va.us	804-786-6140
Linda Pearsall	NC Natural Heritage Program	Linda.pearsall@ncmail.net	919-715-8697
Dave Penrose	NC Division of Water Quality	Dave.Penrose@ncmail.net	919-715-3481
Jean Richter	FWS/Roanoke River Natl Wildlife Refuge	jean_richter@fws.gov	252-794-3808 ext. 22
Jeanne Robbins	US Geological Survey	jrobbins@usgs.gov	919-571-4017
R. Roos-Collins	Natural Heritage Institute	rrcollins@n-h-i.org	510-644-2900 ext 103
Ron Sechler	National Marine Fisheries Service	ron.sechler@noaa.gov	252-728-5090
Wayne Short	Natural Resource Conservation Service	wayne.short@nc.usda.gov	252-583-3481 ext. 3
Richard Stimson		rstimson@schoollink.net	252-586-3304
Boyd Strain	Lake Gaston Association	bstrain@duke.edu	252-257-2881
John Sutherland	NC Division of Water Resources	john.Sutherland@ncmail.net	919-715-5446
Charles Theobald	NC Division of Water Resources	charles.theobald@ncmail.net	919-715-5425
Jim Thornton	Dominion Resources Services, Inc.	james_thornton@dom.com	804-273-3257
Carol Tingley	NC State Parks/Resource Management	carol.tingley@ncmail.net	919-715-8691
Phil Townsend	U. of Md. Center for Env. Science	townsend@al.umces.edu	301-689-7124
Cindy Tripp	Roanoke River Partners	director@roanokeriverpartners.org	252-794-2793
Scott Van Horn	NC Wildlife Resources Commission	scott.vanhorn@ncwildlife.org	919-528-9886
Terry Wagner	VA Dept. of Environmental Quality	tdwagner@deq.state.va.us	804-698-4043
Tom Wilcox	VA Dept of Game & Inland Fisheries	twilcox@dgif.state.va.us	804-367-8998
Nancy Wilson	Vance County Dept of Tourism	vctourism@gloryroad.net	252-438-2222

ATTACHMENT 3
WORK GROUPS

WORK GROUPS

Downstream Flow and Riparian Ecosystem
Jim Mead, LEAD - NCDWR
Jeff Richter – USACE
John Hazelton – USACE
Jennifer Everett – NCDWQ
John Dorney – NCDWQ
Adugna Kebede – NCDWQ
Earl Gillis – NCWRC
Linda Pearsall (NCNHP)
John Ellis – USFWS
Jean Richter – FWS – ref
Harvey Hill –FWS - ref
Jerad Bales – USGS
Sam Pearsall – TNC
Bob Lindsay – RRBA
Bob Graham – Dominion
Masato Miwa – IP

Water Quality
Jennifer Everett, LEAD - NCDWQ
Frank Yelverton, LEAD – USACE
Jim Mead – NCDWR
Jim Mulligan – NCDWQ
Adugna Kebede – NCDWQ
Pete Kornegay – NCWRC
Wayne Jones – NCWRC
Joe Hassell – VADEQ
Bud LaRoche – VADGIF
Tom Augsburger – USFWS
Jean Richter – FWS – ref
Jerad Bales – USGS
Bill Bolin – Dominion
Martin Lebo – Weyerhaeuser

Diadromous Fish and Downstream Riverine Aquatic Resources
Pete Kornegay, LEAD – NCWRC
Chuck Wilson, LEAD – USACE
Bill Bolin – Dominion
Pres Brownell – NMFS
Tom Fransen – NCDWR
Bob Graham – Dominion
Joe Hightower – USGS
Wilson Laney – USFWS
Bud LaRoche – VADGIF
Jim Mead – NCDWR
Kent Nelson – NCWRC
Dave Penrose – NCDWQ
Sara Winslow – NCDMF

Sedimentation & Channel Morphology
Hasan Pourtaheri, LEAD - USACE
Greg Williams, LEAD – USACE
Jennifer Everett – NCDWQ
Adugna Kebede – NCDWQ
Jean Richter – FWS – ref
Cliff Hupp – USGS
Phil Townsend – TNC
Bill Bolin – Dominion

Reservoir Resources
Tom Fransen, LEAD - NCDWR
Bud LaRoche, LEAD - VADGIF
Dianne Edwardson – USACE
Frank Snipes – USACE
Wayne Jones – NCWRC
Scott VanHorn – NCWRC
Brian Strong – NCDPR
Leon App – VADCR
Bob Munson – VADCR
Carter Edge – SEPA
Gene Addesso – RRBA
Jack Hearne – Steel Crk Marina
Russel Slayton – RPLG
Jim Thorton – Dominion

Downstream Flow-based Recreation
Jim Mead, LEAD – NCDWR
Dianne Edwardson – USACE
Frank Snipes – USACE
Kent Nelson – NCWRC
Leon App – VADCR
Bob Munson – VADCR
Jean Richter – FWS – ref
Harvey Hill –FWS - ref
Cindy Tripp – RR Partners
Jack Hearne – Steel Crk Marina
Jim Thorton – Dominion

Salt Wedge
John Hazelton, LEAD – USACE
Greg Williams, LEAD – USACE
Tom Fransen – NCDWR
Jennifer Everett – NCDWQ
Jim Mulligan – NCDWQ
Adugna Kebede – NCDWQ
Pete Kornegay – NCWRC
Jerad Bales – USGS
Jim Thorton – Dominion
Martin Lebo – Weyerhaeuser

Water Supply
Tom Fransen, LEAD -NCDWR
Terry Wagner, LEAD - VADEQ
Allen Piner – USACE
Tony Young – USACE
John Morris – NCDWR
Joe Hassell – VADEQ
Carter Edge – SEPA
Bob Lindsay – RRBA
Tom Leahy – VA Beach
Russell Slayton – RPLG
Jim Thorton – Dominion

Operating Policies and Administrative Procedures
John Morris, LEAD – NCDWR
Joe Hassell, LEAD – VADEQ
Terry Brown – USACE
Diane Edwardson – USACE
Jim Mead – NCDWR
Tom Fransen – NCDWR
Pete Kornegay – NCWRC
Carter Edge – SEPA
Sam Pearsall – TNC
Richard Roos-Collins – TNC
Bob Lindsay – RRBA
Tom Leahy – VA Beach
Jerry Lovelace – RPLG
Jim Thorton – Dominion
Brian McCrodden – Hydrologics

Modeling Oversight
Tony Young, LEAD - USACE
Terry Brown - USACE
Tom Francen - NCDWR
Joe Hassel - VADWQ
Adugna Kebede - NCDWQ
Jim Mead - NCDWR
Sam Pearsall - TNC
Vacant - Stakeholder Representative

Team Leaders
Jennifer Everett, - NCDWQ
Tom Fransen, - NCDWR
Pete Kornegay, – NCWRC
Bud LaRoche, - VADGIF
Jim Mead, – NCDWR
John Hazelton, – USACE
John Morris, – NCDWR
Hasan Pourtaheri, - USACE
Terry Wagner, - VADEQ
Greg Williams, – USACE
Chuck Wilson, – USACE
Frank Yelverton, – USACE
Tony Young, - USACE

ATTACHMENT 4
THREE PHASE STUDY APPROACH

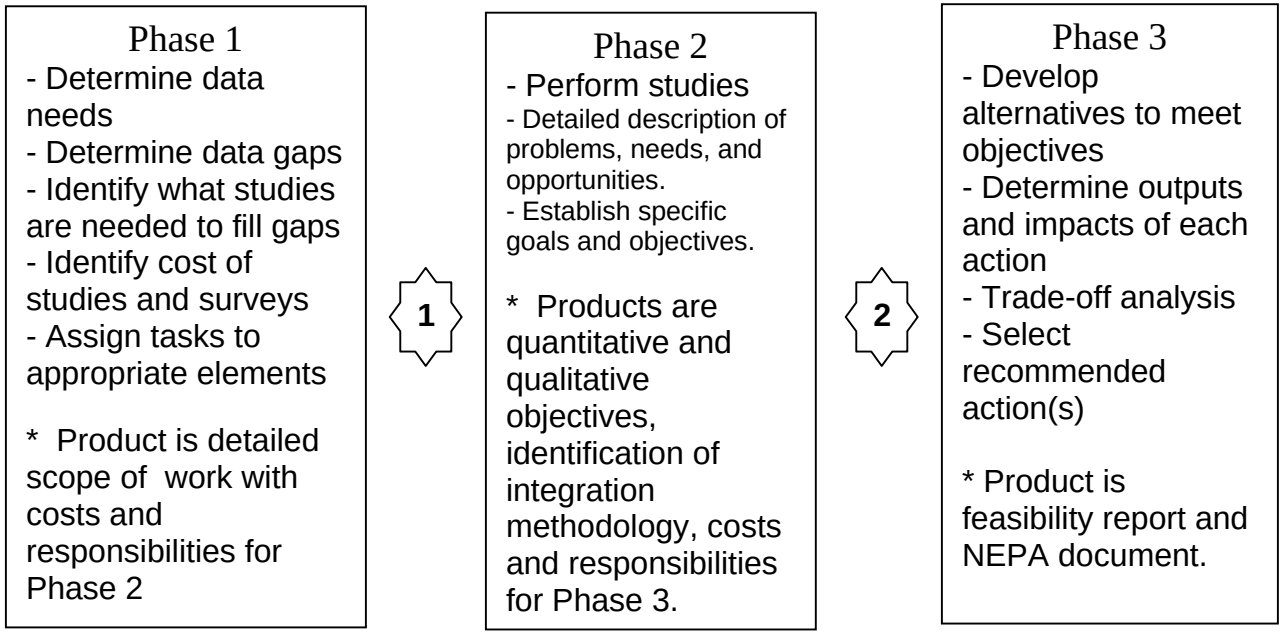
ATTACHMENT 4

THREE PHASE STUDY APPROACH

Corps Requirements: PMP and FCSA must identify full cost of feasibility study
FCSA must identify allocation of costs for each partner

Sponsor Requirements: PMP should be structured to be useful to project sponsor and beneficiaries.
PMP should identify stakeholder contributions
PMP should address tasks, methods, costs, and responsible parties

Actions: Project Management Plan will be structured to identify a 3-phase approach, identify Subject Matter Specialists for phase 1 activities, and costs for each project phase. The three phases are described in the following table.



1 Decision Point 1 – what studies, surveys, etc. will be conducted in Phase 2 and how will the costs be allocated.

2 Decision Point 2 – what objectives will be addressed in Phase 3 and how will costs be allocated.

ATTACHMENT 5
FEASIBILITY COST SHARING AGREEMENT

AGREEMENT
BETWEEN THE DEPARTMENT OF THE ARMY
AND
THE COMMONWEALTH OF VIRGINIA
AND
THE STATE OF NORTH CAROLINA
FOR THE
JOHN H. KERR DAM AND RESERVOIR
SECTION 216 FEASIBILITY STUDY

THIS AGREEMENT is entered into this 17th day, of June, 2003, by and between the Department of the Army (hereinafter the "Government"), represented by the U.S. Army Engineer, Wilmington District (hereinafter the "District Engineer"), and the Commonwealth of Virginia, represented by the Depnty Secretary of Natural Resources and the State of North Carolina, represented by the Secretary, Department of Environment and Natural Resources (hereinafter the "Sponsors").

WITNESSETH, that

WHEREAS, the Congress has authorized the Secretary of the Army, acting through the Chief of Engineers, to review the operation of projects constructed by the Corps of Engineers for navigation, flood control, water supply, and related purposes when found advisable due to significantly changed physical, economic or environmental conditions, and to report to Congress with recommendations on the advisability of modifying the structures or their operation, pursuant to the authority provided by Section 216 of the River and Harbor and Flood Control Act of 1970, Public Law 91-611; and

WHEREAS, the Government has conducted a reconnaissance study of the operations of the John H. Kerr Dam and Reservoir and the effects to the Lower Roanoke River Basin pursuant to this authority, and has determined that further study in the nature of a "Feasibility Phase Study" (hereinafter the "Study") is required to fulfill the intent of the study authority and to assess the extent of the Federal interest in participating in a solution to the identified problems; and

WHEREAS, Section 105 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, specifies the cost sharing requirements applicable to the Study; and

WHEREAS, the Sponsors have the authority and capability to furnish the cooperation hereinafter set forth and are willing to participate in study cost sharing and financing in accordance with the terms of this Agreement; and

WHEREAS, the Sponsors and the Government understand that entering into this Agreement in no way obligates any party to implement a project and that whether the Government supports a project authorization and budgets it for implementation depends upon, among other things, the outcome of the Study and whether the proposed solution is consistent with the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies and with the budget priorities of the Administration.

NOW THEREFORE, the parties agree as follows:

ARTICLE I - DEFINITIONS

For the purposes of this Agreement:

A. The term "Study Costs" shall mean all disbursements by the Government pursuant to this Agreement, from Federal appropriations or from funds made available to the Government by the Sponsors, and all negotiated costs of work performed by the Sponsors pursuant to this Agreement. Study Costs shall include, but not be limited to: labor charges; direct costs; overhead expenses; supervision and administration costs; the costs of participation in Study Management and Coordination in accordance with Article IV of this Agreement; the costs of contracts with third parties, including termination or suspension charges; and any termination or suspension costs (ordinarily defined as those costs necessary to terminate ongoing contracts or obligations and to properly safeguard the work already accomplished) associated with this Agreement.

B. The term "estimated Study Costs" shall mean the estimated cost of performing the Study as of the effective date of this Agreement, as specified in Article III.A. of this Agreement.

C. The term "excess Study Costs" shall mean Study Costs that exceed the estimated Study Costs and that do not result from mutual agreement of the parties, a change in Federal law that increases the cost of the Study, or a change in the scope of the Study requested by the Sponsors.

D. The term "Study Period" shall mean the time period for conducting the Study, commencing with the release to the U.S. Army Corps of Engineers, Wilmington District of initial Federal feasibility funds following the execution of this Agreement and ending when the Assistant Secretary of the Army (Civil Works) submits the feasibility report to the Office of Management and Budget (OMB) for review for consistency with the policies and programs of the President.

E. The term "PMP" shall mean the Project Management Plan, which is attached to this Agreement and which shall not be considered binding on any party and is subject to change by the Government, in consultation with the Sponsors.

F. The term "negotiated costs" shall mean the costs of in-kind services to be provided by the Sponsors in accordance with the PMP.

G. The term "fiscal year" shall mean one fiscal year of the Government. The Government fiscal year begins on October 1 and ends on September 30.

ARTICLE II - OBLIGATIONS OF PARTIES

A. The Government, using funds and in-kind services provided by the Sponsors and funds appropriated by the Congress of the United States, shall expeditiously prosecute and complete the Study, in accordance with the provisions of this Agreement and Federal laws, regulations, and policies.

B. In accordance with this Article and Articles III.A., III.B. and III.C. of this Agreement, the Sponsors shall contribute cash and in-kind services equal to fifty (50) percent of Study Costs other than excess Study Costs. The Sponsors may, consistent with applicable law and regulations, contribute up to 50 percent of Study Costs through the provision of in-kind services. The in-kind services to be provided by the Sponsors, the estimated negotiated costs for those services, and the estimated schedule under which those services are to be provided are specified in the PMP. Negotiated costs shall be subject to an audit by the Government to determine reasonableness, allocability, and allowability.

C. The Sponsors shall pay a fifty (50) percent share of excess Study Costs in accordance with Article III.D. of this Agreement.

D. The Sponsors understand that the schedule of work may require the Sponsors to provide cash or in-kind services at a rate that may result in the Sponsors temporarily diverging from the obligations concerning cash and in-kind services specified in paragraph B. of this Article. Such temporary divergences shall be identified in the quarterly reports provided for in Article III.A. of this Agreement and shall not alter the obligations concerning costs and services specified in paragraph B. of this Article or the obligations concerning payment specified in Article III of this Agreement.

E. If, upon the award of any contract or the performance of any in-house work for the Study by the Government or the Sponsors, cumulative financial obligations of the Government and the Sponsors would result in excess Study Costs, the Government and the Sponsors agree to defer award of that and all subsequent contracts, and performance of that and all subsequent in-house work, for the Study until the Government and the Sponsors agree to proceed. Should the Government and the Sponsors require time to arrive at a decision, this Agreement shall be suspended in accordance with Article X of this Agreement, for a period of not to exceed six months. In the event the Government and the Sponsors have not reached an agreement to proceed by the end of their 6 month period, this Agreement may be subject to termination in accordance with Article X of this Agreement.

F. No Federal funds may be used to meet the Sponsors' share of Study Costs unless the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute.

G. The award and management of any contract with a third party in furtherance of this Agreement which obligates Federal appropriations shall be exclusively within the control of the Government. The award and management of any contract by the Sponsors with a third party in furtherance of this Agreement which obligates funds of the Sponsors and does not obligate Federal appropriations shall be exclusively within the control of the Sponsors, but shall be subject to applicable Federal laws and regulations.

ARTICLE III - METHOD OF PAYMENT

A. The Government shall maintain current records of contributions provided by the parties, current projections of Study Costs, current projections of each party's share of Study Costs, and current projections of the amount of Study Costs that will result in excess Study Costs. At least quarterly, the Government shall provide the Sponsors a report setting forth this information. As of the effective date of this Agreement,

estimated Study Costs are $3,000,000 and the Sponsors' share of estimated Study Costs is $1,500,000. The dollar amounts set forth in this Article are based upon the Government's best estimates, which reflect the scope of the study described in the PMP, projected costs, price-level changes, and anticipated inflation. Such cost estimates are subject to adjustment by the Government and are not to be construed as the total financial responsibilities of the Government and the Sponsors.

B. The Sponsors shall provide their cash contribution required under Article II.B. of this Agreement in accordance with the following provisions:

1. For purposes of budget planning, the Government shall notify the Sponsors by August 1 of each year of the estimated funds that will be required from the Sponsors to meet the Sponsors' share of Study Costs for the upcoming fiscal year.

2. No later than 30 calendar days prior to the scheduled date for the Government's issuance of the solicitation for the first contract for the Study or for the Government's anticipated first significant in-house expenditure for the Study, the Government shall notify the Sponsors in writing of the funds the Government determines to be required from the Sponsors to meet their share of Study Costs for the remainder of the first fiscal year. No later than 15 calendar days thereafter, the Sponsors shall provide the Government the full amount of the required funds by delivering a check payable to "FAO, USAED, Wilmington " to the District Engineer or verifying to the satisfaction of the Government that the Sponsors have deposited the required funds in an escrow or other account acceptable to the Government, with interest accruing to the Sponsors or presenting the Government with an irrevocable letter of credit acceptable to the Government for the required funds or providing an Electronic Funds Transfer in accordance with procedures established by the Government.

3. For the second and subsequent fiscal years of the Study, the Government shall, no later than 60 calendar days prior to the beginning of such fiscal year, notify the Sponsors in writing of the funds the Government determines to be required from the Sponsors to meet their required share of Study Costs for that fiscal year, taking into account any temporary divergences identified under Article II.D. of this Agreement. No later than 30 calendar days prior to the beginning of such fiscal year, the Sponsors shall make the full amount of the required funds available to the Government through any of the payment mechanisms specified in paragraph B.2. of this Article.

4. The Government shall draw from the funds provided by the Sponsors such sums as the Government deems necessary to cover the Sponsors' share of contractual and in-house financial obligations attributable to the Study as they are incurred.

5. In the event the Government determines that the Sponsors must provide additional funds to meet their share of Study Costs, the Government shall so notify the Sponsors in writing. No later than 60 calendar days after receipt of such notice, the Sponsors shall make the full amount of the additional required funds available through any of the payment mechanisms specified in paragraph B.2. of this Article.

C. Within ninety (90) days after the conclusion of the Study Period or termination of this Agreement, the Government shall conduct a final accounting of Study Costs, including disbursements by the Government of Federal funds, cash contributions by the Sponsors, the amount of any excess Study Costs, and credits for the negotiated

costs of the Sponsors, and shall furnish the Sponsors with the results of this accounting. Within thirty (30) days thereafter, the Government, subject to the availability of funds, shall reimburse the Sponsors for the excess, if any, of cash contributions and credits given over their required share of Study Costs, other than excess Study Costs, or the Sponsors shall provide the Government any cash contributions required for the Sponsors to meet their required share of Study Costs other than excess Study Costs.

D. The Sponsors shall provide their cash contribution for excess Study Costs as required under Article II.C. of this Agreement by either: delivering a check payable to "FAO, USAED, Wilmington" to the District Engineer; or providing an Electronic Funds Transfer in accordance with procedures established by the Government; as follows:

1. After the project that is the subject of this Study has been authorized for construction, no later than the date on which a Project Cooperation Agreement is entered into for the project; or

2. In the event the project that is the subject of this Study is not authorized for construction by a date that is no later than 5 years after the date of the final report of the Chief of Engineers concerning the project, or by a date that is no later than 2 years after the date of the termination of the Study, the Sponsors shall pay their share of excess Study Costs on such date either 5 years after the date of the final report of the Chief of Engineers or 2 years after the date of the termination of the study.

ARTICLE IV - STUDY MANAGEMENT AND COORDINATION

A. To provide for consistent and effective communication, the Sponsors and the Government shall appoint named senior representatives to an Executive Committee. Thereafter, the Executive Committee shall meet regularly until the end of the Study Period.

B. Until the end of the Study Period, the Executive Committee shall generally oversee the Study consistently with the PMP.

C. The Executive Committee may make recommendations that it deems warranted to the District Engineer on matters that it oversees, including suggestions to avoid potential sources of dispute. The Government in good faith shall consider such recommendations. The Government has the discretion to accept, reject, or modify the Executive Committee's recommendations.

D. The Executive Committee shall appoint representatives to serve on a Study Management Team. The Study Management Team shall keep the Executive Committee informed of the progress of the Study and of significant pending issues and actions, and shall prepare periodic reports on the progress of all work items identified in the PMP.

E. The costs of participation in the Executive Committee (including the cost to serve on the Study Management Team) shall be included in Study Costs and shared in accordance with the provisions of this Agreement.

ARTICLE V – DISPUTE RESOLUTION

As a condition precedent to a party bringing any suit for breach of this Agreement, that party must first notify the other parties in writing of the nature of the purported breach and seek in good faith to resolve the dispute through negotiation. If the parties cannot resolve the dispute through negotiation, they may agree to a mutually acceptable method of non-binding alternative dispute resolution with a qualified third party acceptable to all parties. The parties participating in the non-binding alternative dispute resolution shall each pay an equal share of any costs for the services provided by such a third party as such costs are incurred. Such costs shall not be included in Study Costs. The existence of a dispute shall not excuse the parties from performance pursuant to this Agreement.

ARTICLE VI - MAINTENANCE OF RECORDS

A. Within 60 days of the effective date of this Agreement, the Government and the Sponsors shall develop procedures for keeping books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to this Agreement to the extent and in such detail as will properly reflect Study Costs. These procedures shall incorporate, and apply as appropriate, the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 C.F.R. Section 33.20. The Government and the Sponsors shall maintain such books, records, documents, and other evidence in accordance with these procedures for a minimum of three years after completion of the Study and resolution of all relevant claims arising therefrom. To the extent permitted under applicable Federal laws and regulations, the Government and the Sponsors shall each allow the other to inspect such books, documents, records, and other evidence.

B. In accordance with 31 U.S.C. Section 7503, the Government may conduct audits in addition to any audit that the Sponsors are required to conduct under the Single Audit Act Amendments of 1996, 31 U.S.C. Sections 7501-7507. Any such Government audits shall be conducted in accordance with Government Auditing Standards and the cost principles in OMB Circular No. A-87 and other applicable cost principles and regulations. The costs of Government audits shall be included in Study Costs and shared in accordance with the provisions of this Agreement.

ARTICLE VII - RELATIONSHIP OF PARTIES

The Government and the Sponsors act in independent capacities in the performance of their respective rights and obligations under this Agreement, and neither is to be considered the officer, agent, or employee of the other.

ARTICLE VIII - OFFICIALS NOT TO BENEFIT

No member of or delegate to the Congress, nor any resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom.

ARTICLE IX - FEDERAL AND STATE LAWS

In the exercise of the Sponsors' rights and obligations under this Agreement, the Sponsors agree to comply with all applicable Federal and State laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in 32 C.F.R. Part 195, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army".

ARTICLE X - TERMINATION OR SUSPENSION

A. This Agreement shall terminate at the conclusion of the Study Period, and neither the Government nor the Sponsors shall have any further obligations hereunder, except as provided in Article III.C. of this Agreement; provided, that prior to such time and upon thirty (30) days written notice, any party may terminate or suspend this Agreement. In addition, the Government shall terminate this Agreement immediately upon any failure of the parties to agree to extend the study under Article II.E. of this Agreement, or upon the failure of the Sponsors to fulfill their obligation under Article III of this Agreement. In the event that any party elects to terminate this Agreement, the parties shall conclude their activities relating to the Study and proceed to a final accounting in accordance with Article III.C. and III.D. of this Agreement. Upon termination of this Agreement, all data and information generated as part of the Study shall be made available to all parties.

B. Any termination of this Agreement shall not relieve the parties of liability for any obligations previously incurred, including the costs of closing out or transferring any existing contracts.

C. In the event that either of the Sponsors elect to terminate its own responsibilities under this Agreement, and the remaining Sponsor elects to continue to participate in the Study, the Government shall negotiate in good faith with the remaining Sponsor to effect a timely and productive conclusion to that portion of the Study pertaining to the remaining Sponsor's area of statutory authority. The Government shall prepare a revised PMP and revised estimated Study Costs, including the remaining Sponsor's share, to complete that portion of the Study of interest to the remaining Sponsor. If the remaining Sponsor elects to complete the Study, this Agreement shall be amended to reflect the negotiated revisions to the PMP and Study Costs. Cost amendments to this Agreement made pursuant to this paragraph shall reflect credits for the previous cash and in-kind contributions of all Study Sponsors and shall reflect task reductions made as a result of withdrawal of any Study Sponsor.

ARTICLE XI – NOTICES

A. Any notice, request, demand, or other communication required or permitted to be given under this Agreement shall be deemed to have been duly given if in writing and either delivered personally or by telegram or mailed by first-class, registered, or certified mail, as follows:

If to the Commonwealth of Virginia:

David K. Paylor, Deputy Secretary
of Natural Resources
P.O. Box 1475
Richmond, Virginia 23218

If to the State of North Carolina:

John N. Morris, Director
NC Division of Water Resources
1611 Mail Service Center
Raleigh, NC 27699-1611

If to the Government:

Charles R. Alexander, Colonel
U.S. Army Corps of Engineers
P.O. Box 1890
Wilmington, NC 28402-1890

B. A party may change the address to which such communications are to be directed by giving written notice to the other party in the manner provided in this Article.

C. Any notice, request, demand, or other communication made pursuant to this Article shall be deemed to have been received by the addressee at the earlier of such time as it is actually received or seven calendar days after it is mailed.

ARTICLE XII – OBLIGATION OF FUTURE APPROPRIATIONS

A. Nothing herein shall constitute, nor be deemed to constitute, an obligation of future appropriations by the General Assembly of the Commonwealth of Virginia, where creating such an obligation would be inconsistent with the Constitution or the statutory limitations of the Commonwealth of Virginia.

B. Nothing herein shall constitute, nor be deemed to constitute, an obligation of future appropriations by the General Assembly of the State of North Carolina, where creating such an obligation would be inconsistent with the Constitution of the State of North Carolina.

C. The Sponsors intend to satisfy their obligations under this Agreement. The Sponsors shall include in their budget requests or otherwise propose, for each fiscal period, appropriations sufficient to cover the Sponsors' obligations under this Agreement for each year, and will use all reasonable and lawful means to secure the appropriations for that year sufficient to make the payments necessary to fulfill their obligations hereunder. The Sponsors reasonably believe that funds in amounts sufficient to discharge these obligations can and will lawfully be appropriated and made available for this purpose. In the event the budget or other means of appropriations does not provide funds in sufficient amounts to discharge these obligations, the Sponsors shall use their best efforts to satisfy any requirements for payments under this Agreement from any other source of funds legally available for this purpose. Further, if the Sponsors are unable to satisfy their obligations hereunder, the Government may exercise any legal rights it has to protect the Government's interests related to this Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement, which shall become effective upon the date it is signed by the District Engineer.

DEPARTMENT OF THE ARMY

BY: _____
Charles R. Alexander, Jr.
Colonel, Corps of Engineers
District Engineer
Wilmington District

DATE: 6/17/03

COMMONWEALTH OF VIRGINIA

BY: _____
David K. Paylor
Deputy Secretary of Natural Resources

DATE: 6-10-2003

STATE OF NORTH CAROLINA

BY: _____
William G. Ross, Jr.
Secretary, Department of Environment and Natural Resources

DATE: 5-22-03

CERTIFICATE OF AUTHORITY

I, Roger L. Chaffe, do hereby certify that I am authorized by the principal legal officer of the Commonwealth of Virginia to make this certification; that the Commonwealth of Virginia is a legally constituted public body with full authority and legal capability to perform the terms of the Agreement between the Department of the Army, the Commonwealth of Virginia, and the State of North Carolina in connection with a study of the John H. Kerr Dam and Reservoir; and that the persons who have executed this Agreement on behalf of the Commonwealth of Virginia have acted within their statutory authority.

IN WITNESS WHEREOF, I have made and executed this certification this 9th day of June, 2003.

Roger L. Chaffe
Senior Assistant Attorney General
Commonwealth of Virginia

CERTIFICATE OF AUTHORITY

I, James C. Gulick, do hereby certify that I am authorized by the principal legal officer of the State of North Carolina to make this certification; that the State of North Carolina is a legally constituted public body with full authority and legal capability to perform the terms of the Agreement between the Department of the Army, the Commonwealth of Virginia, and the State of North Carolina in connection with a study of the John H. Kerr Dam and Reservoir; and that the persons who have executed this Agreement on behalf of the State of North Carolina have acted within their statutory authority.

IN WITNESS WHEREOF, I have made and executed this certification this 22nd day of May, 2003.

James C. Gulick
Senior Deputy Attorney General
State of North Carolina

CERTIFICATION REGARDING LOBBYING

The undersigned certifies, to the best of his or her knowledge and belief that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

David K. Paylor
Commonwealth of Virginia
Deputy Secretary of Natural Resources

DATE: 6-10-03

CERTIFICATION REGARDING LOBBYING

The undersigned certifies, to the best of his or her knowledge and belief that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

DIRECTOR
DIV. OF PURCHASE AND SERVICES

William G. Ross, Jr.
State of North Carolina
Secretary, Department of Environment and Natural Resources

DATE: 5-22-03